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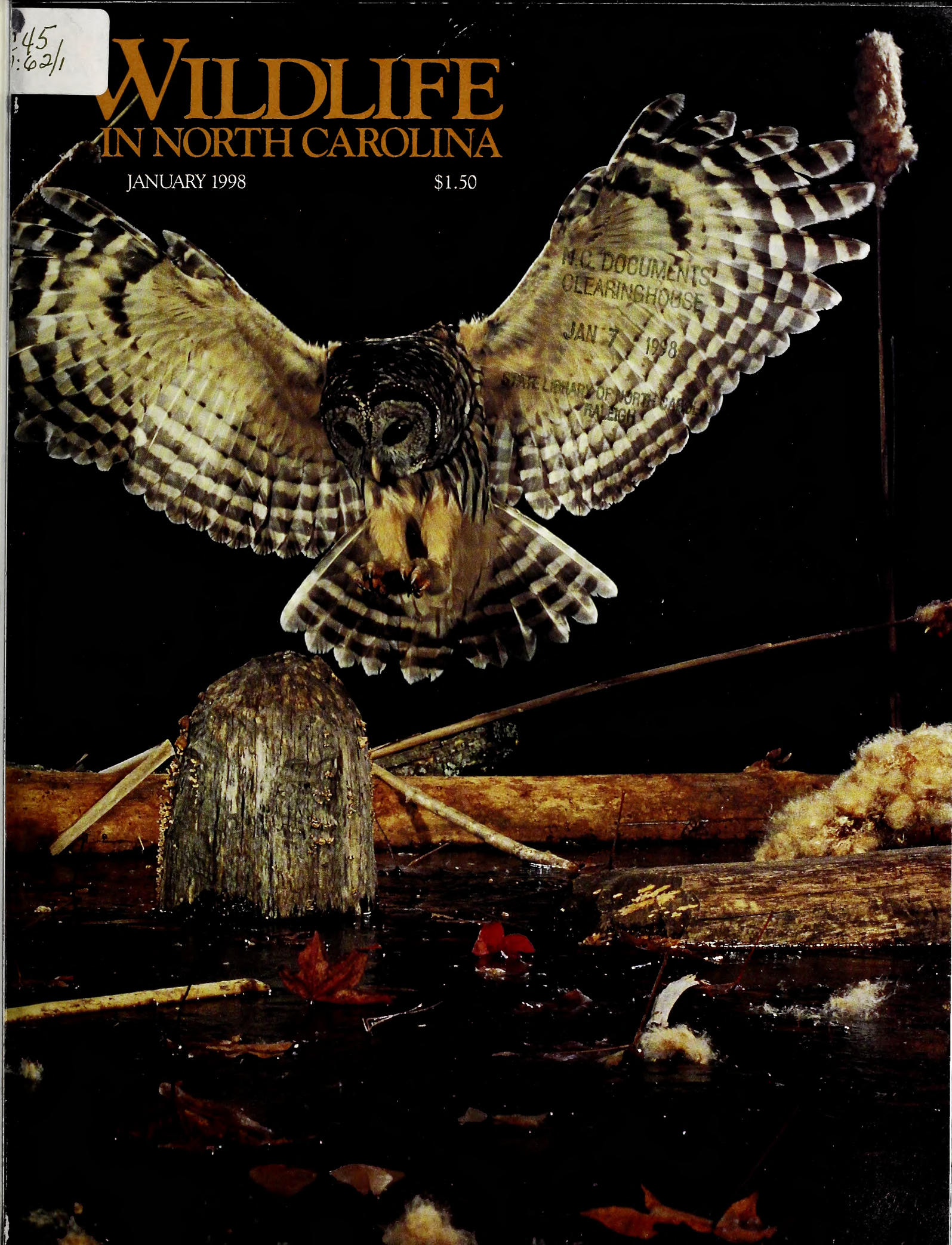

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Still Worth the Trouble

by Jim Dean ©1998

ILLUSTRATED BY JACKIE PITTMAN ©1997

The hardwoods along the rural Granville County blacktops were nearing peak color one day this past fall when Dad and I stopped to see Mike Gaddis. Lady bugs were everywhere, dust motes drifted in the bright sun and the woods had a hot, dry smell. We walked down the path to Mike's kennels where he proudly showed off his latest year-old litter of English setters, all licks, leaps and love. Meg came out of her barrel to greet us, but stood quietly with the dignity befitting her 14 years.

Was it just last January, or the one before, that she found that covey in the field behind the cabin? Her staunch point in the first vaporous swirls of light snow was steady even under the thundering rush of a dozen bobwhites.

As Dad and I followed Mike back to the car, we passed the graveyard where a dozen or more stones are carefully arranged in the woods, each bearing the name of a dog. I know them: Squaw, Mutt, Pat, Cindy, the others.

Mike, at one point, was not certain that he and Loretta would raise and train another litter, even at the risk of losing the line of breeding that has served him so many years, and so well. It is not just the inevitable sadness of losing such close companions every 10 to 15 years, it is the realization that any new setter or pointer, regardless of its innate and learned skills, has far fewer opportunities to prove itself on wild birds these days.

But Mike speaks of dogs, past and present, in ways that make it clear that there's far more involved here than hunting. He loves the sweet smell of puppy breath, the sharp teeth on bare ankles, the bold and awkward inquisitiveness and that first tentative point when a young dog is introduced to a quail wing tethered on a bamboo pole. Again and again, Mike has seen intelligence, trust and loyalty grow into an unmeasured desire to please. But more than any of this, he is forever astonished by the near human—and sometimes hilarious—ways dogs relate to their two-legged companions.

"I had a dog—Beda was her name—that had wonderful qualities, but she had one flaw as a young dog," Mike recalls. "She quickly learned my limitations, and if she observed that I had momentarily lost sight of her, she would take off to hunt alone. She found plenty of birds and undoubtedly had a great time, but she preferred that I not get in the way.

"When I showed up a few minutes later, the shocked look on her face was priceless. I know she was thinking, 'How did he do that?'"

"It was a trait that needed a quick remedy before it became a ruinous habit. Fortunately, I had just begun to experiment with dog training using telemetry," he said. "With a hand-carried radio and a small transmitter on the collar, you can track the exact location of the dog. The first time I used that system, Beda had run off as usual and I suspected she was pointing a distant covey. When I showed up a few minutes later, the shocked look on her face was priceless. I know she was thinking, 'How did he do that?'

"After I quickly tracked her down several times, you could see her figuratively throw her paws up in the air as if to say, 'Well, dang, here he is again. I guess I'm gonna have to hunt with the so-and-so.'"

Mike's story reminds me of a pointer named Frank that belonged to my grandfather's brother. The brother seldom missed a bird, whereas my grandfather seldom hit one—a singular lack of skill he has passed on to his son, and his son, and mine (there's no escape, alas, from the effects of line breeding). One day, granddad borrowed Frank for a hunt, but every time Frank pointed and the birds got up, my grandfather would miss with both barrels.

Finally, after Granddad missed an easy, near gliding straight-away shot across an open field on the fourth covey, Frank turned and looked at him. Then, he headed straight for the house, ignoring every call and whistle. When my grandfather got there, Frank was hiding under the porch and wouldn't come out.

As for Dad, his beloved Buck—we somewhat affectionately called him the "Pointer of No Return"—died years ago. He was followed a dozen years later by Jake, a puppy from one of Mike's earlier litters. It was like losing members of the family. Dad simply couldn't endure that again at the time, so he's been without a dog for years.

Now he says he's too old for another dog, but I'm not quite sure of that. I saw the way he looked at those puppies.

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CONTENTS

WILDLIFE IN NORTH CAROLINA

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January 1998 *Volume 62, Number 1*

page 14

page 20

FEATURES

4 **Tar Heels in Russia** *by Terry Sharpe*
When Russians wanted to build a huge national park, a few North Carolina wildlife biologists and educators jumped at the chance to help. Little did they know how much they would learn.

10 **The Accidental Perch** *written by Pete Kornegay*
photographed by F. Eugene Hester ©1998
Anglers usually catch it when they're fishing for something else, but the yellow perch may be worth more of an effort.

14 **Piedmont Patriarch** *written by Eddie Nickens* ©1998
photographed by Lawrence S. Earley
The Mason Farm Biological Reserve reveals its quiet pleasures a little at a time. And it has lessons to teach those who would watch and listen.

20 **Caught in the Act** *photographs by Derrick Hamrick* ©1998
This photographer uses infrared beams and other high-tech wizardry to freeze wildlife in their tracks. But his determination to succeed is what sets him apart.

page 10

DEPARTMENTS

Our Natural Heritage *by Jim Dean* ©1998 .....**inside cover**
Nature's Ways *by Lawrence S. Earley* 2
N.C. WILD Notebook *by Consie Powell* ©1998 28
Back Porch *by Rodney Foushee* 32
Wildlife Through the Year *by Rodney Foushee* 36

Cover *Frozen by the photographer's lights, a nocturnal barred owl hangs over an icy pond. Photographed by Derrick Hamrick.* ©1998

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After the Chestnut

written by Lawrence S. Earley
illustrated by David Williams

Once there grew a tree so tall and of such enormous girth that it was known as the queen of forest trees. It could grow 100 feet tall with some specimens achieving diameters of 10 feet or even 20 feet. Its straight-grained wood didn't warp and resisted decay. Logs could be split easily and turned into remarkable, long-lasting products—split-rail fences, log cabins, furniture.

The tree produced nuts each year, dependably dropping thousands of the large and tasty mast and it was a rare forest animal that would not make use of them. Hog drovers in the Southern Appalachians relied on them to feed their hogs on the way to market. Families gathered the nuts and shipped them to cities where they stuffed the Christmas goose.

But soon after the beginning of this century, the tree was struck by a blight introduced from abroad and over the next few decades almost every mature tree died. It was an ecological disaster.

Of course we're talking about the tragic story of the American chestnut. In some parts of the Appalachians, the chestnut made up about 25 percent of the forest, and on high ridges there were often pure stands of the tree. Some old chestnuts stood their ground as snags for a decade or more even after they died, but eventually their branches fell and the trees toppled to the ground. These canopy openings offered increased light and moisture conditions that many trees could now exploit.

But which trees? The question has interested forest researchers for decades, with inevitable controversies taking place as some researchers predicted one direction the forest seemed to be taking while others claimed another.

Forest researchers have identified three different "strategies" by which trees filled the openings left by the chestnuts. Many co-dominant trees that were already growing near a chestnut widened their crowns to exploit the open space. In other cases, saplings and seedlings present at the time of the trees' death now had a chance to shoot for the sun and fill the open space, instead of languishing in the shadow of the chestnut. Other invading seedlings, such as those from red maples, might have germinated rather than perished, their likely fate in a mature chestnut forest.

Twenty-five years after the catastrophe, some researchers claimed that the post-chestnut forest was being dominated by oaks—in particular northern red oak and chestnut oak. But was 25 years enough time to make predictions about the effects of the chestnut's loss? Indeed, almost 50 years after the first chestnut deaths, studies found that the dominant tree in some openings left by chestnuts in the Southern Appalachians was the hickory. The oak-dominated forest was becoming an oak-hickory forest.

Peter White, director of the North Carolina Botanical Garden, suggests that the variations that researchers found in forest composition could be explained more by the sites they were examining. "The original distribution of American chestnut was quite extensive, from nearly streamside to extremely dry ridges," he points out. "In all of these sites it would naturally have had different associated species. And that's what you would find replacing it."

More pointedly, he also suggests that now it may be difficult to isolate the effects of the chestnut's demise on the forest from other human agents. For example, mountain forests were regularly subjected to natural fires, a disturbance that set back forest succession and created openings for new growth. Native Americans burned the woods and European settlers continued the practice as well. But in the 20th century, woods burning was discouraged and fires were suppressed, and that change in fire regime, White says, might have caused a new direction in forest succession.

The story of what is succeeding the chestnut in our mountain forests may well illustrate yet again the profound and unwitting effects that we have on our native ecosystems. A foreign blight that extinguished such a useful and beneficial tree species is only one of the most visible changes we have brought to the green land we entered.

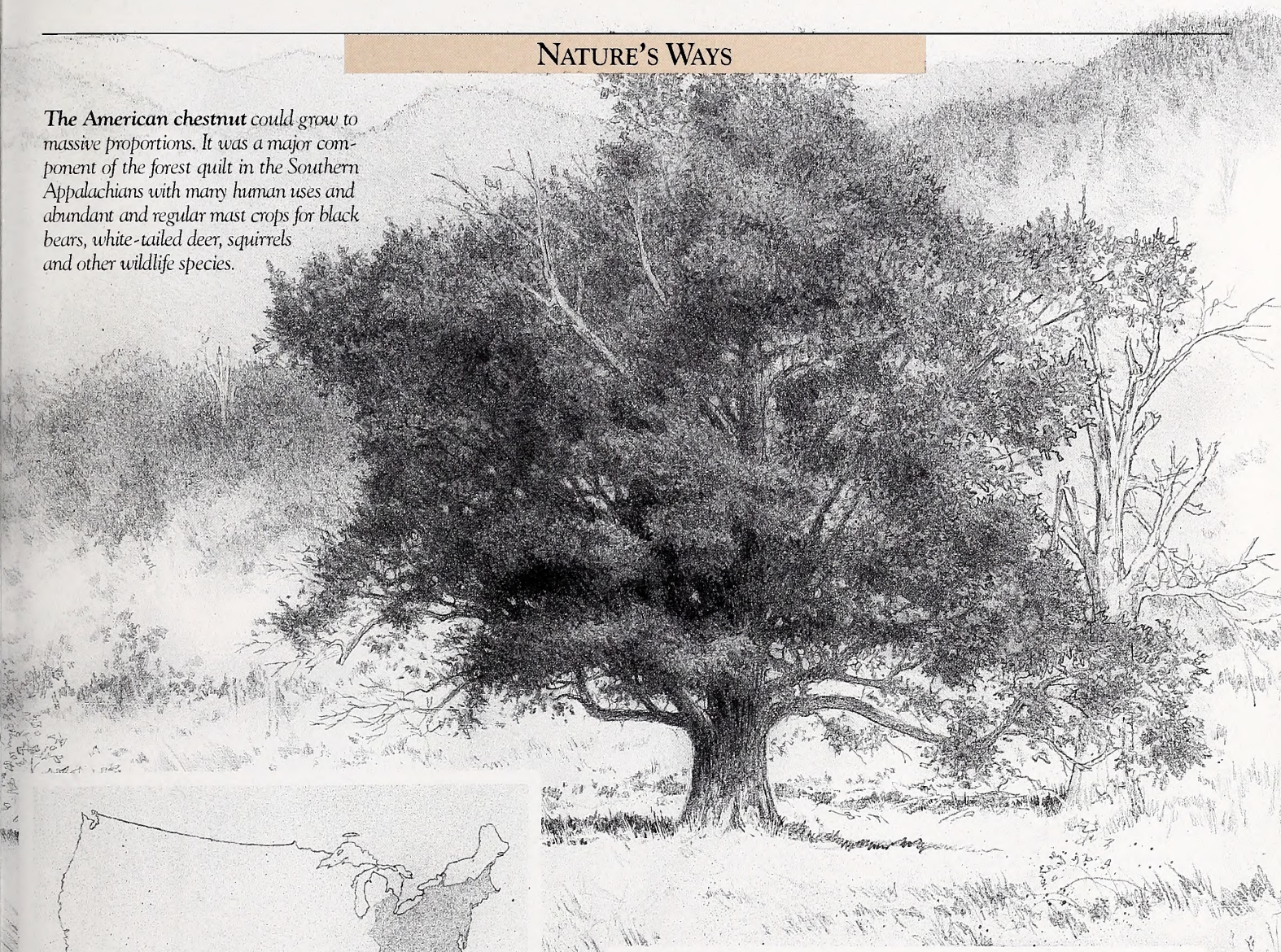
Other Reading

- "Catastrophe and the Appalachian Quilt," in George Constantz's *Hollows, Peepers and Highlanders: An Appalachian Mountain Ecology* (Mountain Press Publishing Co., 1994).
- J. Frank McCormick and Robert B. Platt, "Recovery of an Appalachian Forest Following the Chestnut Blight. . . ," *The American Midland Naturalist*, v. 104 (2), 1980.

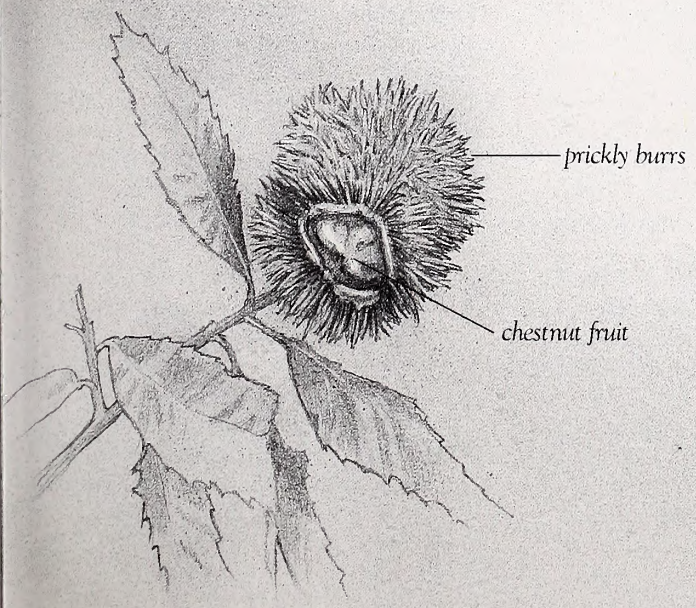
Surfing the Web

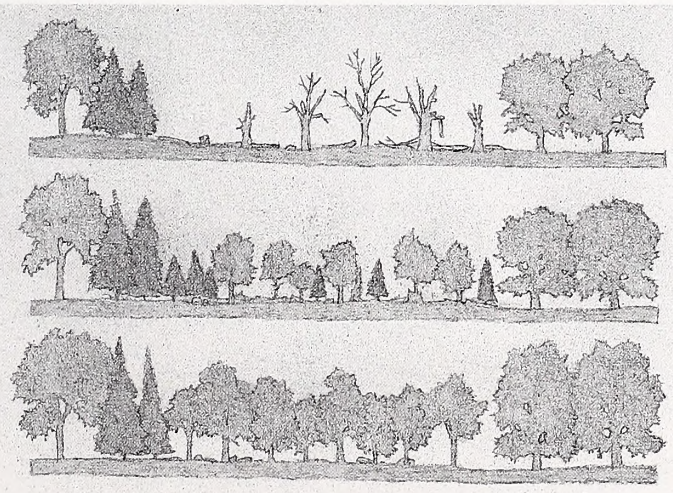
- The goal of the American Chestnut Foundation is to restore the American chestnut tree "through a scientific breeding program and cooperative research." *Address:* http://chestnut.acf.org
- A short article on the American chestnut, its importance and decline can be found on the NCNatural web site, "North Carolina's Living 'Zine." *Address:* http://ncnatural.com/NCNatural/trees
- A detailed account of the introduction of the chestnut blight can be found in the March 1996 issue of "The Woodworking Times." *Address:* http://www.woodworking.com/magazine/mar96/chestnut/cnut3.html

The American chestnut *could grow to massive proportions. It was a major component of the forest quilt in the Southern Appalachians with many human uses and abundant and regular mast crops for black bears, white-tailed deer, squirrels and other wildlife species.*



The historic range of *the chestnut*





When trees as colossal as *chestnuts died and then fell, they created openings for new trees and other plants to grow (top). Some researchers studying the natural succession of trees in these new spaces predicted that the chestnut-dominated forest would be replaced by a forest of oaks and hemlocks (middle). Others believed hickories would dominate the openings (bottom).*

TAR HEELS IN RUSSIA

When Russians wanted to build a huge national park, a few North Carolina wildlife biologists and educators jumped at the chance to help. Little did they know how much they would learn.

by Terry Sharpe

In a way, this is an improbable story. It's a story that we could not have imagined happening a decade ago, and one that still seems unlikely today. On the basic level, this is the story of a park and the people from very different walks of life who joined hands to make it a reality.

Not just any park, mind you, but a sprawling, 350,000-acre island of forest carved out of a huge former timber collective in western Russia. The Smolensk Lakelands National Park is located at the head of the watersheds feeding into the Baltic, Black and Caspian seas near the southern extent of a long-forgotten glacier. The park lies in a transition vegatation zone between the broad-leaved forests of eastern Europe and the evergreen forests of the northern taiga. To give you some sense of its size, think of the 500,000-acre Great Smoky Mountains National Park, which straddles the North Carolina/Tennessee border.

In 1992 a team of Russians developed the idea of the park and secured legislation for its formation. Since then, the Russians have been working tirelessly, and often under difficult financial and bureaucratic stresses, to build their park, very much like early American naturalists, conservationists, writers, politicians and educators who shaped the preservation and conservation efforts for wild places in North Carolina and the United States.

In 1994, two employees of the N.C. Wildlife Resources Commission visited the park. Carl Betsill, a biologist with the Division of Wildlife Management, and Anne Hice, an educator with the Division of Conservation Education, spent two weeks helping to train rangers and teachers. As a result of this visit, park director Sergey Volkov visited North Carolina in 1995 to learn how we manage our state and federal lands. During an exhausting whirlwind tour, Sergey was able to visit and exchange ideas with managers at Jordan Lake State Park, the North Carolina Zoological Park, Sandhills Game Land, Falls of the Neuse Reservoir, Pee Dee National Wildlife Refuge and private hunting lands. He even found time to fish for catfish and enjoy a real North Carolina "pig pickin'" and wild game cookout.

Contacts were made, and so were excited pledges of more help. That's why, a year later, seven professional wildlifers from North Carolina embarked on a cross-cultural journey that took them from the heat and humidity of the North Carolina summer deep into the rural Russian countryside. Little did we know how far the journey would take us from our preconceptions and attitudes, and how changed we would be as a result.

All of us were members of The Wildlife Society, a nonprofit scientific and educational society of wildlife professionals and students (see "The Wildlife Society," p. 9). Three of us—Anne Hice, Mike Carraway and myself—work for the Wildlife Commission. It was Anne's early visits to Russia that had given her the idea of the exchange, and she had tirelessly promoted it ever since returning from her first trip. Steve Brown and York Grow are biologists with the U.S. Army Corps of Engineers; Jim Walker is a free-lance scientific and technical translator from Georgia; and Ed Jones works for the N.C. Cooperative Extension Service. All of us traveled on vacation time and with our own money.

Arriving in Moscow after an 11-hour flight, we packed 17 people and a mountain of luggage into a small bus (without springs) and headed west, into the Russian night. We drove for eight hours, and when we awakened to our first morning in Russia, we found a very different landscape than the one we left. There were no manicured lawns tended by "recreational" mowers here. We saw an occasional farmhouse and tall grasslands interspersed with brush, and as we neared our destination, the road deteriorated into a sandy track across an undulating terrain. The grasslands gradually changed into birch, alder, pine and spruce forests.

After a brief rest in the former hunting lodge that was to be our home for the next two weeks, our group ventured out into the new world. For two weeks we would experience a simple life with no TV, no convenience stores, no telephones ringing and none of the usual demands of home. We would eat potatoes—stewed, boiled, souped, fried, mashed and more of the same—lots of cabbage, black bread, buckwheat porridge and delicious apples.

Our mission was to work with park rangers and foresters to develop their skills in natural resource management. Over the next two weeks, we interacted daily with various members of the park staff, including researchers, foresters, fisheries biologists, enforcement personnel and laborers. Though none of us could speak Russian, and the English skills of the Russians were elementary at best, the language barrier proved a relatively easy hurdle. An interpreter was on hand to translate for us. It took a lot longer to do things, but they got done. As time passed, we learned to appreciate the challenges that Sergey and his staff faced in managing the park—economic hardships,

***North Carolina biologists** who volunteered their experience and skills to help establish the Smolensk Lakelands National Park in western Russia found natural beauty all around. This lovely lake is one of dozens formed by glaciers that scoured the landscape of the huge park thousands of years ago.*

faulty communication and transportation systems, and a public whose primary interest is preparing for the upcoming winter.

"Before I left," says Mike Carraway, "I thought our mission was to exchange information. For my part, I was going to talk to the rangers about the Wildlife Commission's river otter program, because I thought that they also had some species that had been extirpated. But they had a far greater need just for basic infrastructure. They didn't have things like maps at all."

Though cultural and economic conditions varied greatly from those back in North Carolina, many of the problems encountered by Russian park managers were similar to those faced by managers of developing parks and public recreational areas here. The daily routine of the park staff included resolving the inevitable boundary problems, controlling and managing park users, making decisions about what nonconsumptive and consumptive uses (which are legal in the Russian national parks) are to be allowed, and fighting the logistics of managing a huge chunk of real estate.

Yet Russia's cultural and economic differences present a number of unique challenges to the Smolensk Lakelands park staff. Seven thousand people still reside in more than 100 separate villages within the park boundaries. Times are hard for these rural Russians. Cooperative farms and logging operations within the park were abandoned when the Communist regime collapsed. Money is scarce, and store shelves are often empty. The family garden, livestock and the woodpile are the only guards against the harsh Russian winter. Most of the park residents are farmers with a history of park use for grazing livestock and gathering firewood. Understandably, few of them supported the idea of turning their home into a park. Park enforcement personnel are challenged by poachers who, for the most part, travel by foot from their homes to add wildlife protein to their families' menu.

In fact, law enforcement issues drew the most interest from the Russian rangers. "One of the presentations I gave was a video that explained the Corps of Engineers staffing at our lakes and how our rangers interact with Wildlife Commission enforcement officers," says Steve Brown. "I was surprised at the interest they showed, but that's because of the problems they have with poaching. Their economic situation forces the people to look at the wildlife resources in the park as a food resource. So poaching is a real problem, either for meat on the table or, among more affluent members of society, for trophies. They were keenly interested in how North Carolina's officers dealt with it."

The Russian political system has never depended upon the local community to support or drive programs. Policy has been dictated from the top. Through the eyes of our team, the greatest challenge facing the success of the park is to sell the vision of the park leadership to residents in the local villages and nearby towns, whose attitudes and behavior may well determine if the goals of the park are reached.

"They are trying to maintain strong public support among the local people while protecting the wildlife resource base," says Brown. "So it makes for a fine line they have to tread."

Perhaps because of the depressed economy, the typical Russian is much more woods wise than most Americans. As an example, two of our Russian interpreters, Julie Galkina and Larissa Soushkina, college students from downtown Moscow, were a storehouse of knowledge about edible plants and mushrooms. The harsh economic conditions have created an almost universal interest in gardening and wildcraft. In fact, park visitation rates invariably peak during the berry season, the mushroom season and the winter ice fishing season. Park visitors not out to "forage" were primarily there for a swim or camping trip, to enjoy the serenity offered by a weekend at one of the park's many lakes.

A Russian forester (left) *demonstrates tree-planting techniques to farmers who still live in the park. American Ed Jones is at top right.*

MIKE CARRAWAY

Our band of American scientists was a bit of a curiosity to the park staff as we discussed our various specialties, described our homes and families, and demonstrated a mix of skills, from wing shooting to computer mapping. Along the way, ideas were shared and their merits debated, on nearly every aspect of managing natural resources—from research and education to recreation, enforcement and ecotourism. During three days of seminars and training sessions, our group shared and compared notes about North Carolina land management, wildlife populations, forestry practices and computer technology. Many concepts were difficult to convey, especially speaking through an interpreter. We always wondered what our interpreter was saying,

TERRY SHARPE

MIKE CARRAWAY

The ancient rhythms *of Russian village life are still being carried on inside the park. Thousands of people living in a hundred village inholdings use the park to supplement their meager livings. Gardening and wildcraft skills are necessary, with park use peaking during berry, mushroom and ice-fishing seasons. With poaching a serious problem, the Russian game wardens wanted to learn about wildlife protection in North Carolina.*

since it often took her longer to say in Russian what we said in English.

There is little doubt that the park foresters, who work to protect the area from wildfires, are probably still laughing about the crazy American biologist who taught them how to set the woods on fire through prescribed burning. And what did schoolteachers from public schools in the villages within the park think when wildlife educator Anne Hice encouraged them to lie on the ground to count and then imitate ants?

To explain, the activity is "Ants on a Twig," something that North Carolina schoolteachers are familiar with from Project WILD, the Wildlife Commission's environmental education program. The Russians had never seen anything like the hands-on approach that is presented during these workshops. Victor Antoshchenko, a Russian professor from Smolensk Pedagogical Institute, was impressed with this approach.

"During the lessons, you take part in a creative process in the course of which previously familiar facts are comprehended in a completely new way, and new patterns are revealed," he wrote. "Fairly intense work alternates with playful moments, so captivatingly interesting and dynamic that during a three-hour lesson the audience forgets the need for even a short break. It was new and instructive that in discussing biological material, knowledge of mathematics, history, physics, other special disciplines—and especially literature and art—were used. Thus, an integrated approach is available for teaching ecology."

The two-day education workshop helped Russian and American educators to build bridges between them. The teachers learned a lot that will be useful for their further work with schoolchildren, and we learned that Project WILD teacher training is adaptable and works as well in the Russian educational system as it does in North Carolina. From the reactions observed by the American facilitator during this workshop, the future of Project WILD with Russian teachers is a bright one.

In addition to the many intangible benefits shared during discussions, tours and seminars, our group left one very practical tool with the park—a personal computer, software and fax modem. Because York Grow spent many hours digitizing the entire park, managers will now be able to use the computer to draw maps and develop management plans for sections of the park. They can also develop and print educational materials. As useful as the computer has become for the park's management and administrative functions, e-mail also has become a critical communications link between the Russians and Americans.

Of course the park staff and all the Russians we met went to considerable effort to share their knowledge of the region's unique geology and cultural and human history. The Americans ate *OO ha*, or double fish soup (I'd describe it as fish served with the scales left on and boiled in pond water!), and drank *Chuga*, a tea made from a fungus that grows on birch trees. We relaxed in *banyas* (Russian saunas), had memorable sunset picnics on the lakes, rode sidecar in motorcycles (the Russian answer to carpooling), and

TERRY SHARPE

***A park ranger** and his mother stand in their garden holding carrots grown from American seeds. The national park staff is fighting a sustained battle to protect the fledgling park while maintaining public support.*

MIKE CARRAWAY

***Part of the North Carolina** team that traveled to Russia stand before one of the park signs. Left to right are North Carolina extension biologist Ed Jones, Wildlife Commission educator Anne Hice, Jones's son Nicholas, and Wildlife Commission biologist Terry Sharpe.*

enjoyed many other first-time experiences. Tradition runs deep in the Russian culture, and after an outing or a successful part of our training, there was always a celebration.

Though we learned a lot about the park and its managers and users, many other things would remain a mystery to us. This wasn't due to only the language problem, mostly because our Russian interpreters were an excellent and essential part of the success. Indeed, the language barrier proved easier to overcome than the cultural barrier. Our system and resources are just so different from theirs. We found it difficult to comprehend how the park director, struggling to meet payroll and dealing with employees who depend upon their small farms to supply most of their needs, can maintain his enthusiasm and the vision needed to pass the park into the hands of the next generation.

Yet, we also could see that many of our problems with natural resource management were remarkably the same, and that by working together we could find answers to tough management questions that could benefit all of us.

When we left for home, we were accompanied by the young assistant park director, Sasha Kochergin; our college student interpreters, Julie and Larissa; and a group of Smolensk-area teen-agers, who were coming to the United States to broaden their perspectives and visit American children. This group left us in Washington, D.C., for a two-week exchange visit to Tennessee and Kentucky. Members of our American group traveled to Tennessee at the end of their two-week stay for a farewell visit and sent the young Russians back home with many fond American memories.

As one might expect, our group of wildlife scientists came away from Russia having learned much more than we taught. Indeed, each member of the group gained a greater appreciation for our American lifestyle and respect for the Russian visionaries who struggle daily just to keep the park moving in the right direction.

"It was a rewarding and humbling experience to see what the Russians could accomplish with such limited resources," says Steve Brown.

"What I got out of the trip was a sense of perspective," adds Mike Carraway. "When you go there and see the conditions that they have to work in and see how they're trying to get things done without much of a budget, it makes us realize how good we've got it."

We returned with a shared vision of a magnificent park that is being managed for future generations and a lasting respect for the park staff, who were accomplishing so much with such limited resources. We are comforted that half a world away, deep in the Russian countryside, a small group of our Russian friends share our sense of urgency in managing resources for future generations. ☒

Also contributing to this article were Anne Hice, Mike Carraway, Ed Jones and Steve Brown.

The Wildlife Society

The Wildlife Society, founded in 1937, is a nonprofit scientific and educational organization of professionals active in wildlife research, management, education and administration. The society, with headquarters in Washington, D.C., has 8,600 members, mostly in the United States and Canada, but includes individuals in 40 other countries. The North Carolina chapter is the affiliated state chapter of the professional organization. Its 156 members are employed by state and federal agencies, universities, community colleges, conservation groups and private industry. The group brings together a diverse expertise and background concerning Tar Heel wildlife resources.

Concerned with scientific management of the earth's wildlife resources and their habitats, the society has as its principal objectives: (1) to develop and promote sound stewardship of wildlife resources and the environments upon which wildlife and humans depend; (2) to undertake an active role in preventing human-induced environmental degradation; (3) to increase awareness and appreciation of wildlife values; and (4) to seek the highest standards in all activities of the wildlife profession.

Wildlife biologists in North Carolina often work in relatively isolated environments, with little opportunity for direct professional interchange. In fact, one of the most important functions of the state chapter is to foster communication and professional exchange among the widely dispersed members. The Russian Exchange Program is another means of improving professional interchange and stimulating new ideas within the profession. The exchange opportunity broadens the thinking of professionals here in North Carolina, as well as those half a world away in the Russian countryside.

The state chapter has ambitious goals for its Russian Exchange Program. Over the next two years, the society plans to further upgrade the Smolensk Lakeland computer and mapping capability, host park personnel here in North Carolina, and carry a new group of wildlife professionals to Russia to exchange ideas with park managers there. Several of us returned to the park last summer to continue our work. We have entered the door that was opened in 1992. To quit now would be unthinkable.

For more information about The Wildlife Society, write North Carolina Chapter, The Wildlife Society, P.O. Box 37742, Raleigh, N.C. 27627. Membership is $5 annually.

The Accidental Perch

Anglers usually catch it when they're fishing for something else, but the yellow perch may be worth more of an effort.

written by Pete Kornegay
photographed by F. Eugene Hester©1998

In a strange sort of way, it really doesn't bother me when I'm awakened at dawn on a Saturday morning by my 7-year-old son saying, "Dad, can we go fishing today?" After all, I lit the fishing fire under him when he was just 2, and like most kids, he can't get enough. His first exposure to fishing was at his granddad's pond in Wayne County, where I'd impale a cricket, hook a bluegill and hand him the cane pole to finish the job. Thrilling for him, yes, but I had a grand scheme to immortalize his first, real, "all-by-himself" fish.

On his third birthday, I presented Ben with one of those sawed-off, dime store rod-and-reel outfits made just for kids. Within a week, he was hurling a plastic plug across the backyard. The direction of his casts could best be described as random, but he had the distance part down pat. Finally, the big day arrived. "Son," I said, "we're going fishing today, and the very first fish you catch all by yourself is going to be mounted. But—you've got to cast, hook the fish and reel him in all by yourself."

"OK, Dad," he replied. "What's mounted mean?" After clearing up the details, we headed down to our local boat dock on the Pasquotank River. No sooner had the cricket hit the water than the bobber vanished. After quite a tussle for this 3-year-old, and a near miss with swimming, there it was—a 9-inch yellow perch flopping on the ground and a trophy in any kid's eyes.

Six weeks later, my taxidermist buddy, Mark, called and said, "Ben's fish is ready." The fish is now proudly displayed on the wall of our den along with a small plaque dedicating my son's accomplishment.

A yellow perch has been the first fish for many kids, but if you questioned those who have caught them, this fish would likely be called by some other name. In telling my son's experience to neighbors, "yellow perch" didn't register, but everyone acknowledged the catch of a raccoon perch. In fact, I don't think I've ever heard a fisherman actually call one a yellow perch. "Raccoon perch," "ringed perch" and "redfin" are most commonly used in eastern North Carolina; however, you'll hear of "Englishman" and "preacher fish" as well. The broad, dark bands on yellow perch no doubt give rise to the raccoon and ringed perch aliases, and "redfin" describes the bright red lower fins. Explorer John Lawson, who came to North Carolina in the early 1700s, was likely describing yellow perch with the words "the same sort of Pearch as are in England" and later, in a comparison to other perch, referred to them as "the red ones." To this day, some biologists still argue that the Eurasian perch of Lawson's home country and North America yellow perch are the same species. As for the origin of "preacher fish," I have not a clue.

Far from a drab species, the yellow perch is one of the most beautiful fish around. The bright yellow to gold sides are streaked with six to nine dark, vertical bars and are accented by reddish orange pelvic, pectoral and anal fins. As with many other animals, males are usually more brightly colored. Yellow perch look similar to walleyes and are in the same family with the walleye, sauger and even the tiny darters.

As a Wildlife Resources Commission fisheries biologist, I get to talk to plenty of anglers each year, but I seldom encounter anyone fishing specifically for yellow perch. It seems that fishermen always catch yellow perch incidentally while fishing for bluegill, crappie and even bass. That's no wonder, considering the wide variety of foods the fish will eat.

As youngsters, yellow perch first feed on microscopic zooplankton. After a few months, they grow to about 1.5 inches long and begin feeding on worms, aquatic insects and small snails. Fish become a part of their diets late in their first year, and one of their favorite fish is *each other*. As adults, perch also feed on insects, worms, leeches and crayfish and readily eat other fish. Like

Raccoon perch, *ringed perch and redfin are some of the most common names for the yellow perch. Though targeted directly by few Tar Heel anglers, once hooked, the yellow perch offers a fine fight and also makes for excellent table fare.*

humans, yellow perch are "opportunistic feeders," devouring whatever happens to be available when the urge strikes. They are sight feeders, feed almost exclusively during the day, and actively feed throughout the year. Plenty of yellow perch are caught on minnows by early-spring crappie fishermen. Several times, I've looked in anglers' coolers to find yellow perch greatly outnumbering crappie. With their diverse diet and voracious appetite, it's no wonder yellow perch will hit nearly any small artificial lure or natural bait an angler can present.

Yellow perch are found in most fresh waters of the eastern and northern United States and all parts of North Carolina except the extreme northwestern mountains. Their tolerance for variable habitat conditions is incredible. During our fish sampling surveys, we've found yellow perch in the blackwater lakes of Alligator River National Wildlife Refuge, where the water is about as acid as cider vinegar. We've also collected yellow perch in the brackish waters of Currituck Sound right alongside flounder and croakers, and they're common as well in Piedmont and Mountain reservoirs. Yellow perch are actually considered a cool water fish and thrive in the frigid waters of the northern United States, including the Great Lakes. Even though yellow perch can adapt to a wide range of conditions, they cannot tolerate polluted water. When biologists sample fish populations, the absence of yellow perch, darters and other members of this family can indicate trouble.

Yellow perch are not opportunists only when it comes to eating; they can also readily take advantage of an "open niche" when offered the chance. Until 1980, yellow perch and white perch coexisted nicely in Lake Phelps in Washington County. The lake provided a famous white perch fishery, and yellow perch were caught occasionally. Then, during the severe winter of 1980-1981, Lake Phelps froze. When it thawed, a massive "winter kill" of white perch was discovered. This phenomenon, although not fully understood, occurs with regularity in northern states and had decimated the white perch population. The following summer, our fish samples in Lake Phelps, taken with a small trawl, were devoid of white perch but contained many yellow perch. During succeeding years, our trawl samples consisted of nearly 100 percent yellow perch, most of which were small. Within a few years, yellow perch had invaded the ecological niche left vacant by the white perch kill. Despite our efforts to restock white perch in Lake Phelps, yellow perch remain dominant to this day.

Along with their flashy good looks and easy-to-please palates, yellow perch have quite a love life as well. Mating takes place in late winter and early spring when water temperatures are around 45 degrees. Males first congregate in spawning areas, usually shallow water with submerged limbs or vegetation, and are later joined by females. As many as 25 males swarm around a female, thrashing and spreading their milt as she exudes long strands of sticky eggs draped over limbs and plants. Most females deposit 15,000 to 25,000 eggs, and these strands can be as long as 8 feet. Once spawning takes place, eggs hatch in 10 to 20 days, and the quarter-inch-long fry are immediately on their own. No parental protection is given to the fry. As in many other fish species, massive numbers of eggs are produced to ensure that adequate numbers of young will survive.

Several years ago, I had the pleasure of certifying a new state record yellow perch. At first glance, the fish required a double take, because I'd never seen a yellow perch look quite this grotesque. The fish was a very pregnant female, and a good deal of her weight was obviously in eggs. My guess is that, had this gal been caught a day later, she probably would have weighed a little over

***Considering the** yellow perch's varied diet and wide distribution, it's surprising more North Carolina anglers don't catch them. While live baits including minnows, worms and crickets are preferred, yellow perch will also readily strike small jigs and spinners.*

a pound rather than 2 pounds 9 ounces!

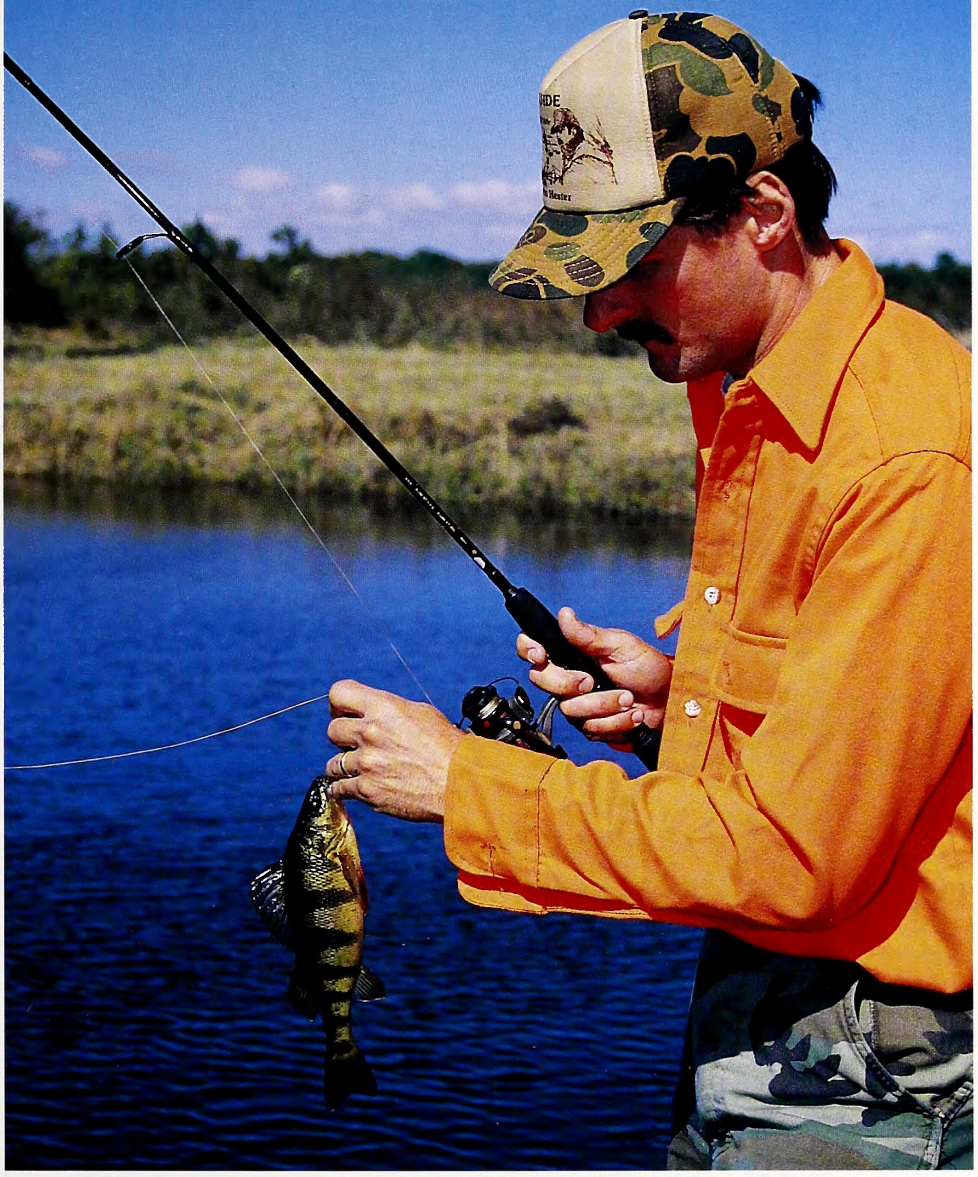
Being active members of the "top of the food chain," yellow perch provide great eating. Granted, their deeply embedded scales are tough to remove, and I've always heard that the easiest way to scale them is to nail them to a plank, then proceed with a garden hoe. I'm the kind of person who likes the path of least resistance, so my tactic is to avoid the problem altogether. The elongated shape of yellow perch really lends itself to filleting, and with a little practice, even small fish can be neatly filleted. Once the fillet is removed, I fillet the meat away from the skin without ever touching a scale. You can fry yellow perch, just as with most other fish, but my favorite is a recipe that I call "perch fingers"—"crappie fingers" if I'm using crappie, etc. First, place the fillets in a greased baking dish and lightly coat them with a half-and-half mixture of melted butter and lemon juice. Then, place a tablespoon or 2 of finely minced onion on top of the fillets, sprinkle them lightly with Old Bay seasoning, and bake at 350 degrees for about 30 minutes.

Because yellow perch are a highly prized table fish, they are, of course, pursued by humans. In North Carolina, yellow perch can be harvested with nets in areas designated as joint or coastal waters. According to N.C. Division of Marine Fisheries statistics, 50,000 to 60,000 pounds of yellow perch are harvested here commercially each year. In the Great Lakes, millions of pounds of yellow perch are harvested each year by both recreational and commercial fishers. Those hardy northern souls who fish through holes in the ice on frozen lakes catch yellow perch with regularity.

But yellow perch are in big trouble in the Great Lakes. In Lake Michigan, for instance, yellow perch harvests have dropped 80 percent since 1990. Researchers aren't sure whether overharvest, environmental factors or a combination of both is responsible, but most states surrounding Lake Michigan have banned commercial fishing and have severely restricted recreational fishing. This has given rise to a booming aquaculture, or fish farming, business in states surrounding the lakes, and the effects have reached as far south as North Carolina. The N.C. Cooperative Extension Service has begun research with a Camden County fish farmer to investigate growing yellow perch to a marketable size in hatchery ponds. Once hatching techniques and diet formulations are perfected, Tar Heel fish farmers should have a ready market for their product in the Great Lakes region.

Despite their commercial potential, yellow perch are likely of little consequence to most North Carolina anglers. You'll hear lots of grumbling from fishermen who didn't catch a bass or a bucket of bluegill or a mess of crappie, but not so much as a word if they don't catch a single yellow perch! When a yellow perch is part of the creel, however, it's always icing on the cake. Biologists typically look at fish and contemplate their function in nature. In the case of yellow perch, their function is to be an "omnivore," consuming insects, worms and other fish as supply and demand dictate. They also serve as prey for other fish and wildlife. Yellow perch and their cousins also give us subtle signals about how well we're doing as stewards of our waters. To paraphrase a famous ecological saying, "In nature, all things are connected," and yellow perch are one of those points of connection. With the burgeoning growth of society today and all its associated strains on water quality and habitat, yellow perch can be added to the list of animals that live in water that we should be concerned about. Twenty-five years from now, I'd really be proud if my grandchild could call a yellow perch his or her first fish. ⊠

Pete Kornegay is a fishery research coordinator with the N.C. Wildlife Resources Commission.



***Though they can be** caught nearly year-round in eastern North Carolina's rivers and creeks, late winter and early spring are the best times to pursue yellow perch.*

Fishing for Yellow Perch

Although few anglers fish specifically for them, here's a brief guide to increase your chances of catching yellow perch:

When: Any season, but most are caught in late winter or early spring. Fall fishing can also be productive.

Where: Nearly any body of water in North Carolina but slow-moving Coastal Plain creeks and rivers and usually produce larger specimens.

Bait: Because yellow perch have a varied diet, they are likely to bite anything that will fit into their relatively small mouths. Small live minnows, worms, crickets and small spinners top the list.

piedmont PATRIARCH

The Mason Farm Biological Reserve reveals its quiet pleasures a little at a time. And it has lessons to teach those who would watch and listen.

written by Eddie Nickens ©1998 / photographed by Lawrence S. Earley

Even then, you could tell that this was a place worth keeping. The land was rich, gentle to the plow and good to seed, and even then, in 1894, had been farmed for 150 years. The woods and swamps were filled with wild turkeys and ducks, and the creek held warmouth and shiners large enough for the pan. Even then, in the year in which the last passenger pigeon was seen in North Carolina, you could tell that these 800 acres of prime Piedmont woodlands, wooded swamp and cultivated fields could be, would be, a place worth keeping.

So, with no one else to leave it to, their four daughters dead and their own spirits broken, the Rev. James Pleasant Mason and his wife, Mary Elizabeth Morgan Mason, willed their farmland, forest and creek swamp to the University of North Carolina. Their only stipulations: that $15 per year be spent to maintain the tiny Mason family burying plot, and that portraits of the Rev. Mason and the two eldest daughters be painted and hung in the university. They required in the will that the land never be divided or sold by the university.

This is how the Mason Farm Biological Reserve began. Time has nipped and whittled at the original acreage, but 367 acres still remain on the southern edge of burgeoning Chapel Hill, set aside as a place of ecological research and private nature study. Here, where Morgan Creek makes a big bend to the south, there is a flat, half-mile-to mile-wide floodplain valley, hemmed in on the west by the forest-cloaked Laurel Hill. Ten minutes from the hubbub of Franklin Street, a bobcat teaches her kittens to lie quietly in the tangled brush and wait for the cotton rats to scurry a bit too close. Twenty minutes from Research Triangle Park, students and professors study how hooded warblers learn to recognize the songs of their neighbors and why some trees have evolved with lobed leaves and others with leaves that are toothed. Walk 300 yards away from the incessant *thwack* of golf clubs on the driving range of Finley Golf Course and you can lie down in a 200-year-old farm road and watch a red-tailed hawk bring food to its young.

Today the Mason Farm Biological Reserve, managed by the North Carolina Botanical Garden, is one of the Piedmont's most significant natural areas. Its Big Oak Woods is the largest tract of old-growth forest in Orange County and the Piedmont's largest remaining mature hardwood bottomland swamp forest. An enormous willow oak swamp flows south from the reserve onto the Jordan Lake floodplain and the New Hope Game Land; it is the largest intact swamp left in the Triangle region. Catawba rhododendron grows in the reserve, as does the largest population of southern shagbark hickory trees known anywhere. And the old farm's significance goes far beyond the scientific. The fields and hedgerows date back to the mid-18th century, when Mark Morgan, grandfather of Mary Elizabeth, settled on the land that was granted to him by the Earl of Granville. In 1961 came another auspicious arrival, John K. Terres, the former editor in

Young tulip poplars

Floodplain valley fields

chief of *Audubon* magazine, who moved to Chapel Hill to finish his 1,109-page opus, *The Audubon Encyclopedia of North American Birds*. In the next 7½ years, Terres walked 5,000 miles and spent 10,000 hours at Mason Farm, then turned those experiences into a book called *From Laurel Hill to Siler's Bog*. The book is a conservation classic, winner of the 1971 John Burroughs Medal for Distinguished Nature Writing and an inspiration for the official establishment of Mason Farm Biological Reserve in 1984.

Even today, this celebrated Piedmont parcel remains "a suburban wilderness" says Haven Wiley, a UNC-Chapel Hill ornithologist, who points out a hawk nest in Big Oak Woods and the buzz of a blue gray gnatcatcher in a snag near Siler's Bog. I could hardly have lucked into a finer day to visit, or a better guide than Wiley. For nearly a quarter century he has prowled these woods and field edges, studying the dynamics of birdsong. Tall and lanky, with a gray beard and dark eyes that lend him the look of a middle-aged John Muir, Wiley leads me along the loop of former farm path that serves as the primary thoroughfare for Mason Farm researchers and visitors. The road is graveled now, not dirt as in Terres' day, but solitude is still a common companion. As late as the 1980s farmers rented the sprawling fields around Big Oak Woods, but no longer are they kept in corn and wheat. Instead, they are plowed every year or so to maintain what for centuries was the archetypical rural Piedmont landscape: hedgerow-rimmed fields bordered by large woodlots, farmhouses perched atop knolls, a lattice of large creeks and small streams delineating property boundaries.

It is this rapidly disappearing diversity of habitats, Wiley says, that gives Mason Farm so much of its value. Most of the North Carolina Piedmont has been ingested by suburbanization, leaving office buildings and subdivisions scattered across former fields and forests like so much industrial scat. Even those native to these rolling hills have all too rarely recognized the allure and value of the Piedmont's natural landscape. It is less celebrated than its more spectacular counterparts, the North Carolina coast and Mountains. But as anyone familiar with an intact Piedmont landscape will tell you, such discrimination is unfounded and unfortunate.

"It is in these small, wild places," Terres wrote in *From Laurel Hill to Siler's Bog*, "that the naturalist finds the Last Frontier." And so they have found it at Mason Farm. Wiley has run a Breeding Bird Census project on two 40-hectare plots of the farm for nearly 25 years—these are the longest-running bird population studies in the Southeast. The censuses have turned up an astounding array of bird life. Two hundred fifteen bird species have been documented at Mason Farm, only one less than the tally for all of Orange County. Eighty-two species are known to breed at the farm, while another 74 have wintered there.

And the birds are not alone. More than 100 other vertebrate species have been documented at Mason Farm, from the rare four-toed salamander that breeds in the swampy

Resting place of the Masons and Morgans

"WE'VE WORKED HARD TO DEFEND THE INTEGRITY OF THE LAND, AND WILL CONTINUE TO."

pools of Yancey Brook to the mink, otter, red and gray foxes, and bobcats that prowl the creeks and edges between field and forest.

This intact landscape has served as a living laboratory for generations of students and academics. Although it is open to the public (visitors must obtain a free permit from the N.C. Botanical Garden and stay on the old farm roads), it is a research facility, not a public park. Each year the Botanical Garden issues some 30 to 40 academic permits for research and teaching purposes. Much of the value of the Mason Farm woods is their age. Many tracts haven't been cut in 150 years, and small, scattered tracts have never been cut at all. One grizzled mockernut hickory has been ring-dated at more than 350 years old. Botanists have a laboratory for long-term studies of forest vegetation composition and how the forest reacts to changes —from the toppling of a single tree to climate changes on a worldwide scale. "These soils and the biodiversity of the understory may be relatively intact," says Peter S. White, director of the Botanical Garden. "The reserve offers a unique opportunity to look at sites that have never seen a plow."

Despite its import to academe, the reserve has found itself in a defensive posture a number of times over the years. There are periodic proposals, Wiley says, to do "something" with the land. A proposal to build a parkway along Laurel Hill isn't likely to be resurrected, especially now that much of the hill will be developed into expensive homesites. The good news: the developers are being sensitive to their location near the reserve and have recently set aside an 80-acre buffer zone between the homes and the Mason Farm property. The university seems to have backed off plans to build playing fields adjacent to the reserve, says White, and thanks to the game land in the Jordan Lake floodplain, the eastern and southern borders of the reserve will be protected for the long term. But the Botanical Garden remains "ever vigilant," says White. "We've worked hard to defend the integrity of the land and will continue to."

Already, inevitably, there has been loss. The 200 acres of Finley Golf Course was the largest chunk to go, cleared and coiffed in the late 1940s. The old Mason farmhouse was bulldozed from beneath a grove of elms and replaced with the golf course clubhouse. And not all the changes at Mason Farm have been at the hand of man. Wiley points to dark bands of vegetation that mottle the old farm fields and give them the look of old salt marsh. "That's bulrush," he says. After the fields were abandoned, they began turning into seasonal marshes. Not far away, on the edge of Big Oak Woods, beavers have flooded a portion of lowlands, killing 6 or 7 acres of hardwoods. When Hurricane Fran blew through North Carolina, the storm took out a few of the largest Shumard oaks in the region and laid the world's largest southern shagbark hickory tree "right down on the ground," Wiley says. People began calling him the week after the storm to ask how the birds would fare. His answer was that of a

Big Oak Woods

Bottomland swamp forest

scientist. "I just said, 'Well, we'll see.'"

But the most important changes to the Mason Farm Biological Reserve are taking place beyond its boundaries. Little tracts of land like the reserve function as little more than isolated islands in the greater suburban landscape that has transformed the Piedmont. As suburbanization intensifies, plants and animals that require large, intact woodlands begin to disappear. Already, Wiley says, the reserve has lost its great horned owls and wild turkeys, and the pileated woodpeckers have begun to move out of Laurel Hill to escape the construction there. "It will be very hard for us to keep the bobcat and the whip-poorwills," Wiley laments. He and other scientists believe that in the headlong rush to protect the last few remaining wild places, we are protecting the trees and forgetting about the forest. "If we don't think about the landscape as well as the acres," Wiley says, "then we're going to lose a lot of things."

In the future, Wiley says, people might still think that Mason Farm is the wildest place around. But they will not have known it when great horned owls roosted here and the occasional black bear wandered down Morgan Creek. I push him for a crystal-ball reading of the future of Mason Farm, but he will go no further than his scientific background will allow. He says, quietly, "There are no simple answers as to how we can have a spring walk like this 20 years from now." If we are able to, it will be because of the university's commitment to keeping Mason Farm an inviolate landscape, and because of the voices of citizens who recognize its rarity.

By the time we circumnavigate the Big Oaks Woods on the farm road, the afternoon is waning, and Wiley has an appointment elsewhere. I stay behind, hoping to go back to the place where we found a large gray scat in the road, possibly the leavings of a coyote, and I want to watch the red-tailed hawks, for it is a day very much like the April day on which Terres saw the red-tailed hawks of Boothe Hill pirouette in the air during a courtship flight.

I drop my small pack and notepad and lie down in the old farm road, the sun baking my shoulders and the insects trilling in the brush. It is the same blue sky that Terres and Mason and Morgan knew, the same road, the same Big Woods, the same 20-miles-per-hour winds roaring like white water in the brambles behind me.

Then again, it is not. The Big Oak Woods have been battered by Fran, and Laurel Ridge will soon be pocked with homesites, and for the first time ever, Yancey Brook will flow through Siler's Bog with water gleaned from a watershed with septic fields. Mason Farm is no longer what it used to be, but one of the reserve's intriguing lessons is that no place ever is.

But the hawks are still there, or a hawk, at the least, and I can't help but wonder if the bird soaring overhead is the progeny of the Boothe Hill redtails, returned to Mason Farm all these generations since.

Through binoculars I watch the hawk watch me. ⊠

Caught in the Act

LAWRENCE S. EARLEY

This photographer uses infrared beams and other high-tech wizardry to freeze wildlife in their tracks. But his determination to succeed is what sets him apart.

photographs by Derrick Hamrick ©1998

It all started with a mental picture and a healthy knowledge of wood duck biology. Four years of persistence and hundreds of hours of work later, Derrick Hamrick captured the seemingly impossible —a close-up shot of a wood duckling's maiden leap from its tree-hatched nest frozen in time. The photograph (see p. 22) took first place over more than 10,000 entries from 52 countries in the world. It's only one of several award-winning stop-action wildlife shots taken by the Raleigh photographer.

Getting such stunning shots is no cakewalk.

"There are plenty of things in nature that are easier to photograph than wildlife," Hamrick explains. "But none hold the challenges of stop-action photography, or the rewards when you finally nail the shot."

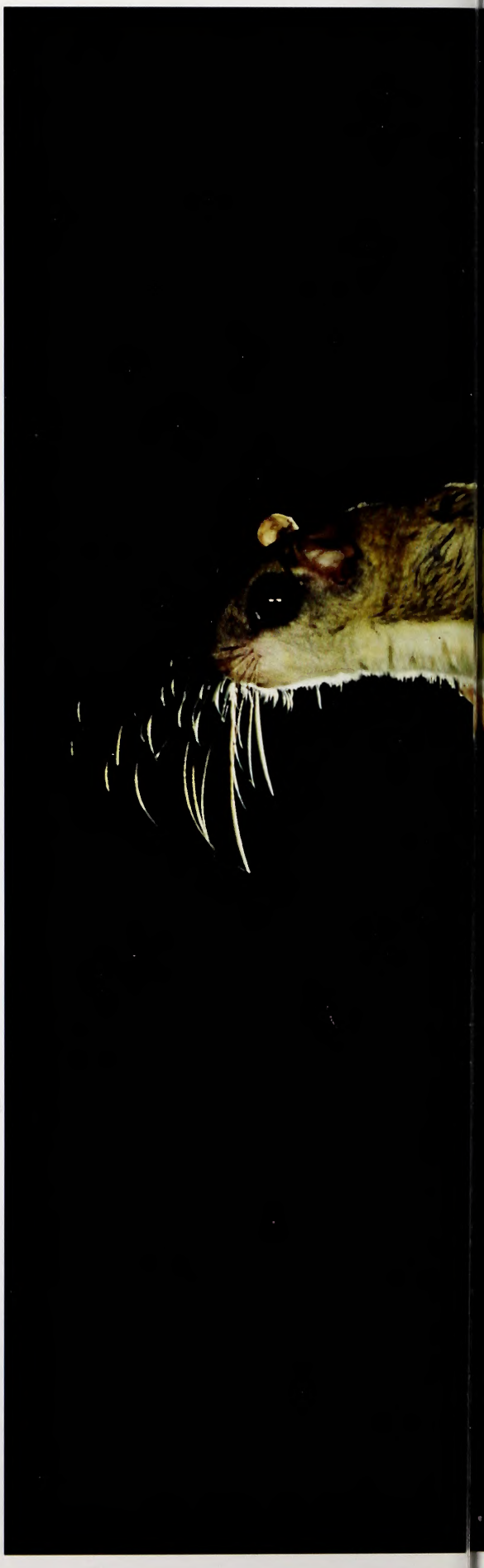
Mountains persist for eons, waterfalls keep on rushing, even trees hold their peak fall colors for several days. But wild animals just don't wait there at close range for you to snap their pictures with your handy point-and-shoot camera. Given their mind-numbing speeds, even when using thousand dollar high-speed flash units and infrared beams to release the camera's shutter, there is little margin for error when an owl is diving towards its prey or a flying squirrel explodes from a tree cavity.

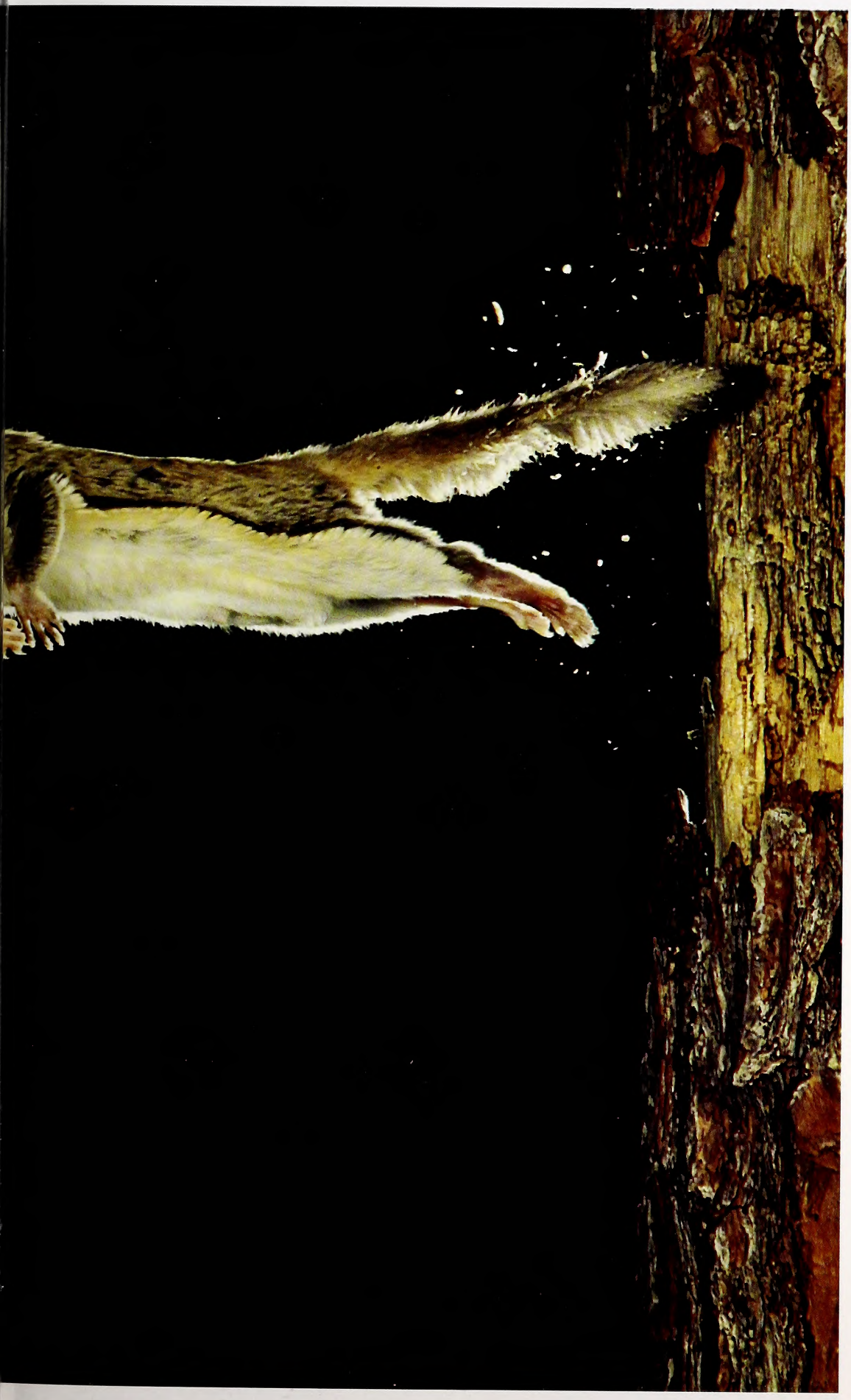
But it's not just the equipment that sets stop-action wildlife photographers apart. They have to be both patient and ingenious as well as possess an intimate understanding of animal behavior. "You don't just go out and snap random shots," Hamrick explains. "First, you have to find the animal species and set everything up the way you want it. Then, you may have to wait days, weeks or even months for that perfect shot." But the rewards of enduring bad weather, broken equipment and unexpected animal behavior are all worth it.

"When you catch an animal with the camera at high speed, whether it's in mid-flight or mid-leap— you are freezing a moment in time. You are able to stop something that the animal does everyday—but human eyes are not quick enough to follow."

Go ahead and flip through the pages, if you haven't already taken a peek, and marvel at the speed of nature slowed to one frame at a time.

—Rodney Foushee





"Night Glider"

Capturing a Southern flying squirrel exploding from a tree hollow in the wild takes patience and knowledge of animal behavior. It took Derrick Hamrick three weeks to set up this shot after finding a willing subject. The photo was taken with a Nikon 200 mm macro lens at a flash duration of 1/25,000 of a second.

Caught in the Act

"Leap of Faith"

This extraordinary picture of a wood duckling making its maiden leap from a nest hole high in an oak tree won Hamrick first place in 1996 in BBC Wildlife Magazine's *wildlife photography contest, the largest such contest in the world.*

"Airborne"
It took the use of infrared beams and high-speed flashes to get this shot of a gray squirrel in mid-leap carrying a pecan. The photograph was the grand prize winner of the Wildlife Federation's National Wildlife photo contest in 1996.

"Hop to It"
Though most wild animals are less than cooperative, this Fowler's toad jumped toward the camera on cue.

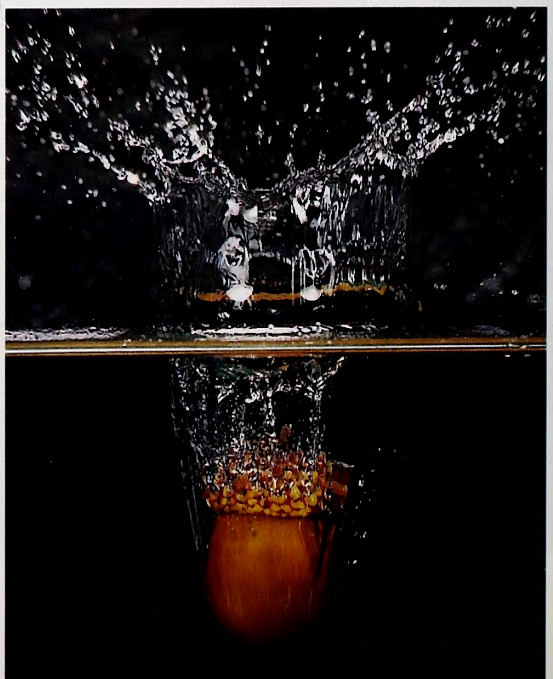
Caught in the Act

"Winged Ghost"

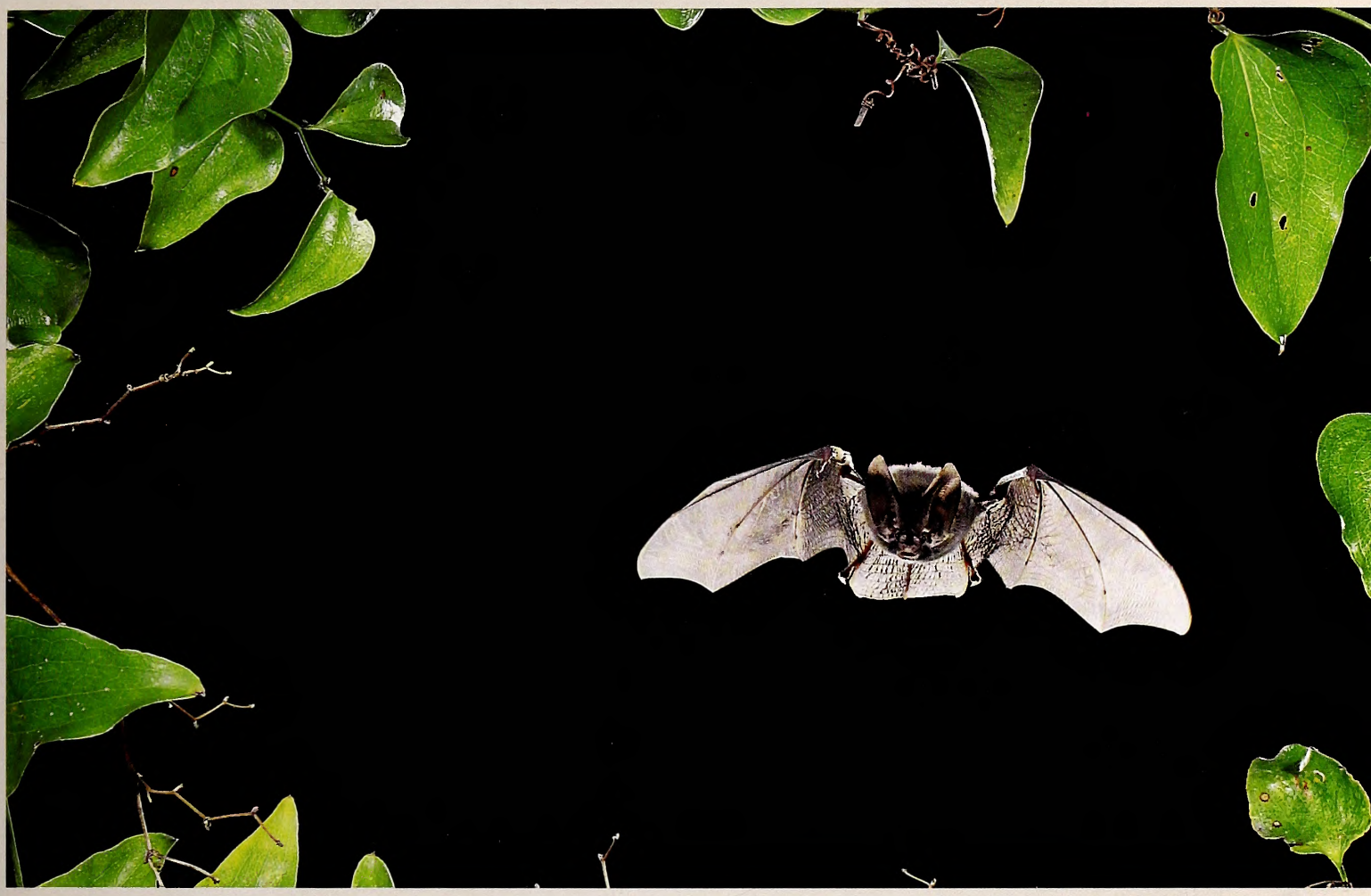
Sometimes just finding the desired species can be a challenge in wildlife photography. Hamrick searched 25 North Carolina counties before finding this nesting barn owl in an old hay barn near Lincolnton. The shot was taken as the owl left the loft after dark to hunt for mice in nearby pastures.

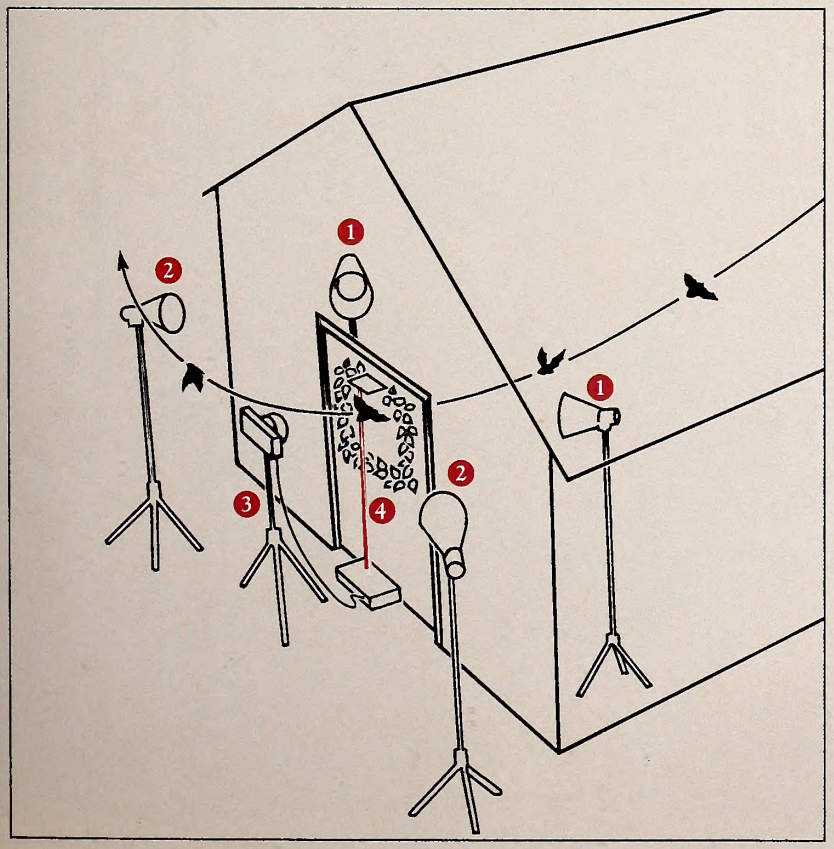
Caught in the Act

"Prepare to Land"
Not known for its great flying skills, a praying mantis uses its stubby wings to reach a brightly colored section of woolgrass bulrush. High-speed flashes set at 1/35,000 of a second were used to freeze the action.



"Fall Plummet"
Even a white oak acorn splashing into a pool of water can create a spectacular image when frozen in time.





"Pre-dawn Maneuvers"

Getting a stop-action shot of the rare Rafinesque's big-eared bat (above) takes ingenuity. After finding a small bat colony living in an abandoned house near Edenton, Hamrick slowly narrowed the bats' main evening exit, a doorway, over a period of a few weeks. He then set up his lights inside (1) and outside (2) the house, focused his camera (3) on a predetermined spot and placed an infrared beam (4) where he thought the bats would pass. The bat's wing broke the remote beam and set off the flashes. Careful framing and a splash of smilax around the opening creates the illusion that the bat is flying in the open sky, not out of a building. ⊠

What's So Special About a MOUSE?

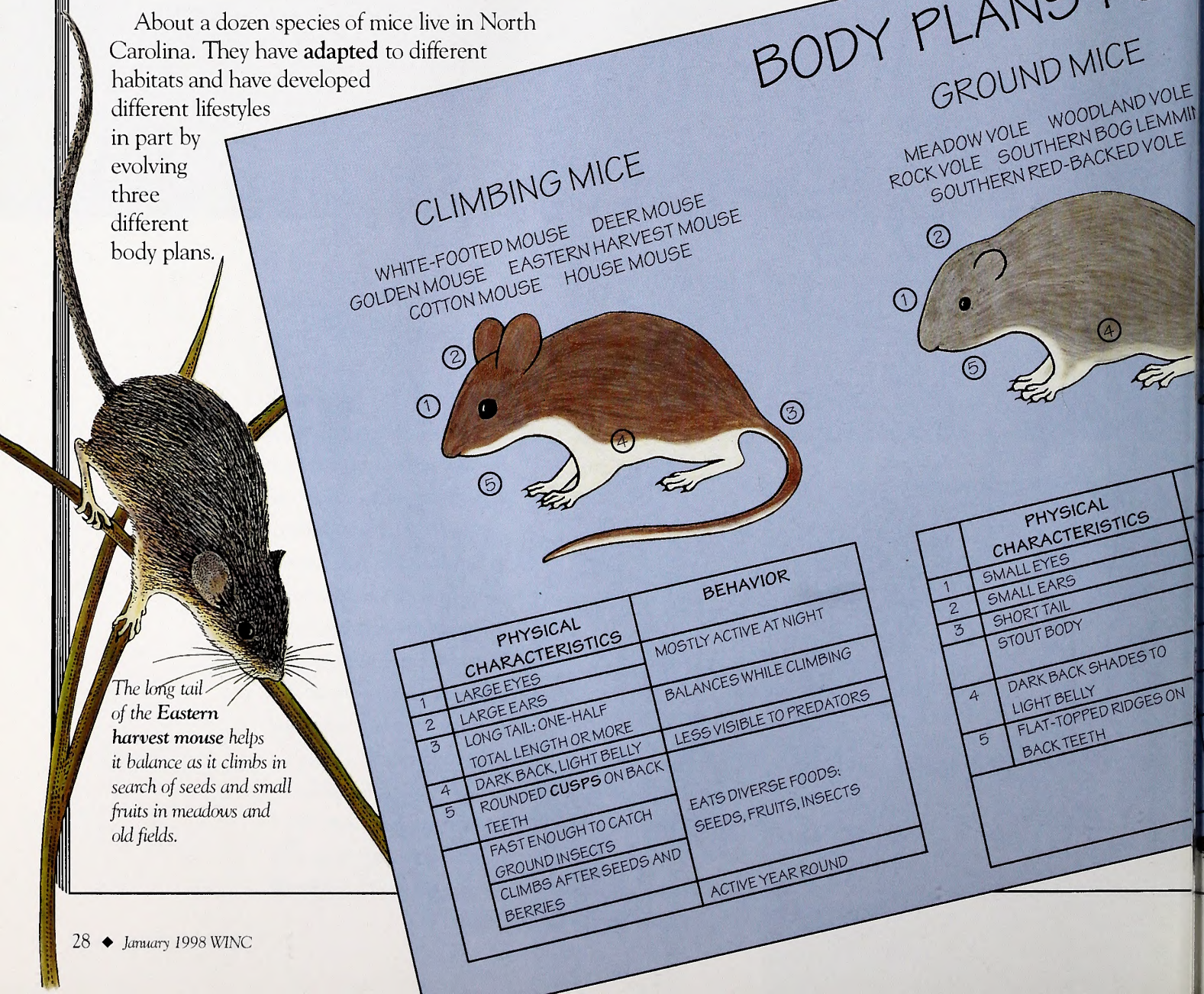
Everybody knows about mice—they're long-tailed, furry little critters that squeak, right? Look closely; there's more to being a mouse than meets the eye.

Written by Roger Powell / Illustrated by Consie Powell

WHAT MAKES A MOUSE?

Many mice have long tails. Mice with short tails are sometimes called voles and those with very short tails are sometimes called lemmings. Mouse-like rodents that are large are called rats. So a big "mouse" is a rat, and a little "rat" is a mouse. Mouse, vole or lemming, these mammals are the smallest of rodents, and their names give us clues about their sizes and job descriptions.

About a dozen species of mice live in North Carolina. They have **adapted** to different habitats and have developed different lifestyles in part by evolving three different body plans.



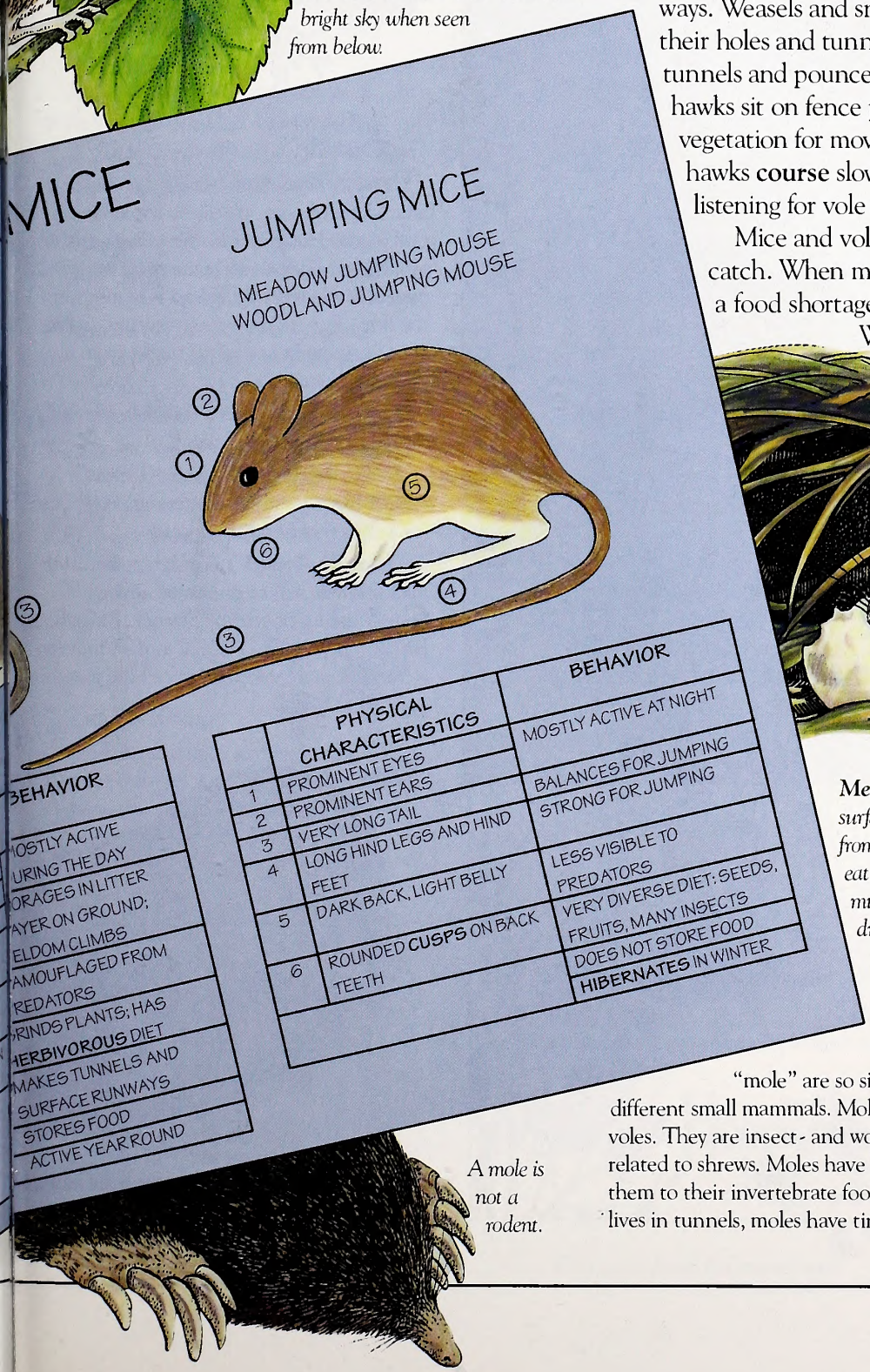
The long tail of the ***Eastern harvest mouse*** *helps it balance as it climbs in search of seeds and small fruits in meadows and old fields.*

The dark backs and light bellies of ***white-footed*** *and* ***deer mice*** *help them avoid forest predators. Their backs blend with the dark ground when seen from above and their bellies blend in with the bright sky when seen from below.*

Food for Predators

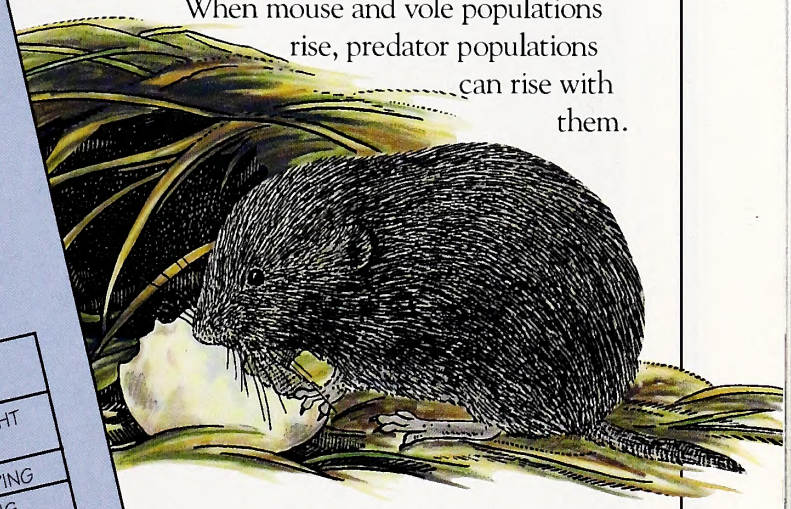
All across North Carolina, mice and voles are the major foods for red and gray foxes, bobcats, weasels, red-tailed hawks, marsh hawks and rat snakes. Because each species of mouse and vole is different from the others, they provide food for predators that hunt in different ways. Weasels and snakes follow mice and voles into their holes and tunnels. Foxes listen for voles in their tunnels and pounce on them from above. Red-tailed hawks sit on fence posts, watching the ground or vegetation for movement, and then pounce. Marsh hawks **course** slowly back and forth across fields, listening for vole sounds.

Mice and voles are quick, cautious and hard to catch. When mouse and vole populations fall due to a food shortage, predator populations also fall. When mouse and vole populations rise, predator populations can rise with them.



	PHYSICAL CHARACTERISTICS	BEHAVIOR
1	PROMINENT EYES	MOSTLY ACTIVE AT NIGHT
2	PROMINENT EARS	BALANCES FOR JUMPING
3	VERY LONG TAIL	STRONG FOR JUMPING
4	LONG HIND LEGS AND HIND FEET	LESS VISIBLE TO PREDATORS
5	DARK BACK, LIGHT BELLY	VERY DIVERSE DIET: SEEDS, FRUITS, MANY INSECTS
6	ROUNDED **CUSPS** ON BACK TEETH	DOES NOT STORE FOOD
		HIBERNATES IN WINTER

A mole is not a rodent.



Meadow voles *make grassy runways along the surface of the ground that provide hidden passage from one foraging spot to another. When voles eat mushrooms, they help the fungi grow, as the mushroom spores are dispersed in their droppings.*

Voles or Moles?

Perhaps because the words "vole" and "mole" are so similar, many people confuse these very different small mammals. Moles are not rodents and are larger than voles. They are insect- and worm-eating specialists that are closely related to shrews. Moles have huge paws for digging tunnels that lead them to their invertebrate food underground. Because they spend their lives in tunnels, moles have tiny eyes and no visible ears.

MOUSES IN HOUSES

The word "mouse" makes many people think of that familiar foreigner, the house mouse. House mice are not native to North America; they were accidentally brought here by European settlers hundreds of years ago. Unlike native mice, they are **commensal** with humans; they live in houses and farm outbuildings, eat our foods, and seldom live in fields and forests. They find discarded or stored human foods and eat stored grain and food meant for livestock. They chew walls, cupboards and even wiring to get to food, and leave **fecal** droppings and smelly urine scent marks wherever they go. Clearly, the activities and behaviors of house mice make them unwelcome guests.

***House mice** are quite social and frequently live in groups. The white mice that are used for laboratory research and as pets are domesticated albino house mice.*

White-footed mice and deer mice are the only native mice to enter houses and that usually happens only in winter when outside temperatures are cold. Even when they live inside, they still forage mostly outside and cause far less damage to human food and buildings than house mice do.

Get Outside

Look for mouse sign: Mice are probably around your house, especially if you have a bird feeder. Hang your feeder in a place above ground litter (leaves and pine needles), watch patiently and you might see a vole move in the litter. Inspect the bases of shrubs or small trees; you might see tooth marks from a gnawing mouse.

Look for tracks: After a snowfall, check for tiny hopping mouse tracks.

Build a mouse house: The book *Beastly Abodes* has a great pattern for a mouse house (as well as other critter houses).

"Meet the Animals": A program featuring mice and rats will be presented at the N.C. State Museum of Natural Science, Raleigh, on Jan. 20, 21 and 22, 11-11:20 a.m. Admission is free. For more information call the museum at (919) 733-7450.

***Woodland voles** are real family mice. Instead of dispersing right away, old parents' subsequent litters.*

What Does It Mean?

adaptation: features of an animal that adjust it to its environment

nocturnal: active at night

cusps: the elevated parts of the teeth that meet teeth from the opposing jaw

herbivorous: eating only plant material

hibernation: period of inactivity with physiological processes greatly reduced and energy requirements greatly lowered

course: to move freely back and forth across an area

commensal: living in association with something else, especially where members of one species benefit from living with another species

fecal: pertaining to feces, or animal solid waste matter

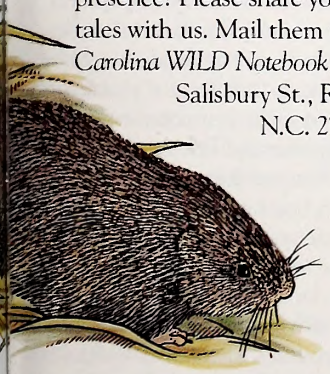
To escape a predator such as a skunk, a ***jumping mouse*** *may make several tremendous bounds, then freeze perfectly still, hidden even in the open.*

Read and Find Out

- *Beastly Abodes: Homes for Birds, Bats, Butterflies & Other Backyard Wildlife* by Bobbe Needham, Sterling Publishing Co., 1995.
- *A Look Through the Mouse Hole* by Heiderose and Andreas Fischer-Nagel, Carolrhoda Books, 1989.
- *Mammals of the Carolinas, Virginia and Maryland* by David Webster et al., University of North Carolina Press, 1985.
- *National Audubon Society Field Guide to North American Mammals* by John O. Whitaker Jr., Alfred A. Knopf, 1996.
- *"January: January Thaw"* in *A Sand County Almanac* by Aldo Leopold, Oxford University Press, 1987.

Let Us Know

Do you have mice (either wild or tame) around your house? What signs have you seen that indicate their presence? Please share your mouse tales with us. Mail them to *North Carolina WILD Notebook*, 512 N. Salisbury St., Raleigh, N.C. 27604-1188.



siblings often stay and help care for babies in their

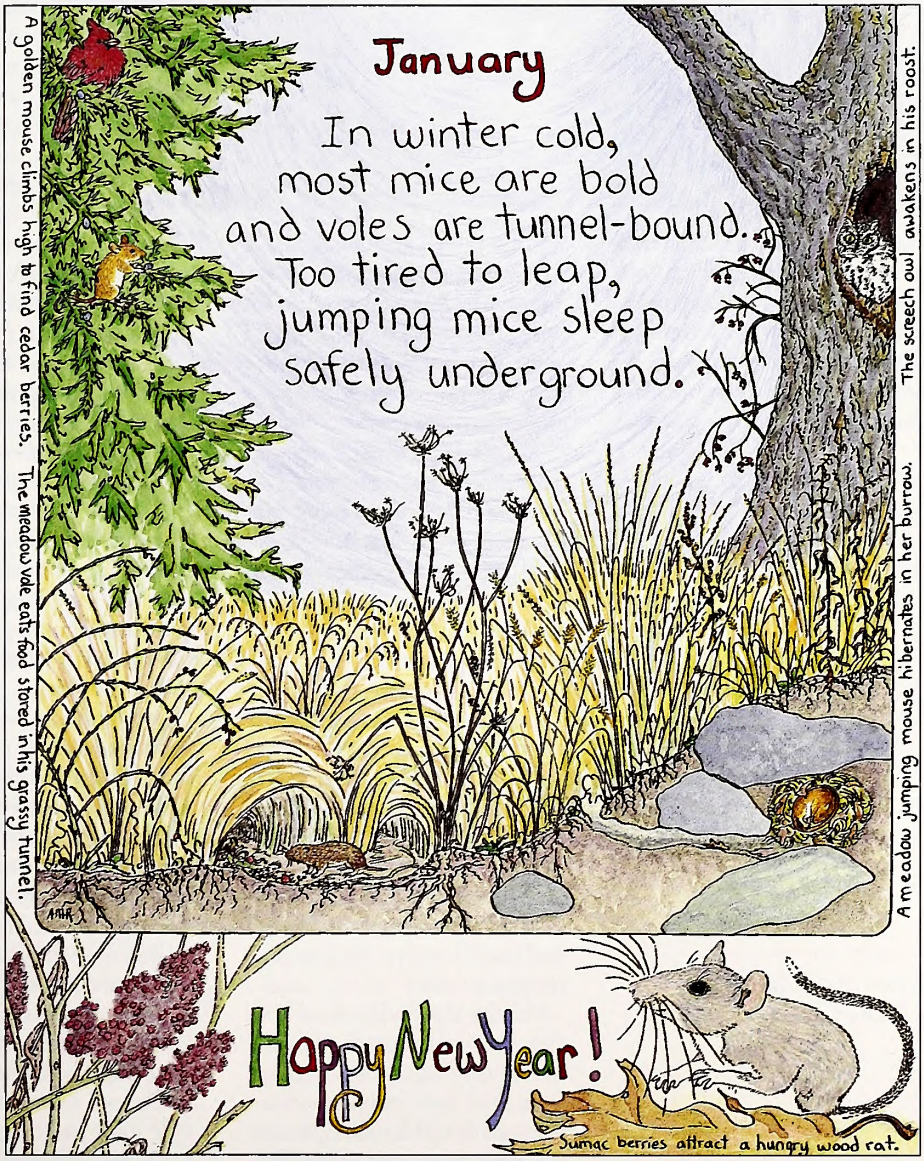
It's Wild!

Project WILD activities for teachers and students that correlate to this topic include:

Saturday Morning Wildlife Watching: teaches students to discriminate between realistic and unrealistic portrayals of animals in cartoons and to determine influences on people from watching such portrayals.

Wildlife Is Everywhere!: teaches students that wildlife includes the smallest animals, and can be found everywhere.

Urban Nature Search: teaches students to understand how each environment has characteristic life forms.



Editing and design by Consie Powell Art puzzle by Anne Marshall Runyon

Bog Turtle Protected by Endangered Species Act

MELISSA McGAW

***Development** and habitat destruction have rapidly reduced bog turtle populations, which face additional pressure from collectors for an illegal pet trade. Biologists hope added federal protection will help reverse the downward trend.*

Written and Edited by Rodney Foushee

The U.S. Fish and Wildlife Service is extending Endangered Species Act protection to conserve the bog turtle —an elusive reptile found in small wetlands from Massachusetts to Georgia.

Rapid development and the destruction of the bog turtle's wetland habitat have reduced its numbers to just a few thousand. And an illegal pet trade —where the tiny turtles sell for $250 and up—has only made things worse.

In the northeastern United States where the situation is the most serious, scientists estimate the bog turtle population has declined 50 percent over the past two decades. Though not as extreme, southern bog turtle populations, including those in North Carolina, have also declined in recent decades due to habitat loss.

Under the Endangered Species Act, the northern population of the bog turtle, ranging from New York and Massachusetts south to Maryland, is now federally designated as threatened. The southern population, which ranges from southern Virginia to northern Georgia, is also protected with a threatened designation because it looks similar to the northern population.

With the new threatened status, collection and other activities including interstate sale, export or import of bog turtles are prohibited by federal law. Those who capture, harm or transport a threatened species face up to $50,000 in fines and up to one year in prison.

A species qualifies for threatened protection under the Endangered Species Act if it is likely to become endangered. An endangered species is likely to become extinct within the foreseeable future.

The bog turtle—North America's smallest turtle—is easily distinguished from other turtles by the large, conspicuous bright orange, yellow or red blotch found on each side of the head. Adult bog turtle shells reach 3 to 4½ inches in length and range in color from light brown to ebony. In North Carolina, bog turtles are found in spring-fed Mountain and Piedmont wetlands. The N.C. Natural Heritage Program estimates the state once had 5,000 acres of these wetlands. Today, only about 500 acres remain.

Though all states where bog turtles are found already provide some protection, biologists hope the federal designation will help reduce national and international pressure for the prized turtles. In North Carolina, bog turtles are also considered threatened by the N.C. Wildlife Resources Commission and are protected by state law.

"The top threat to the bog turtle is habitat loss," said Randy Wilson, section manager of the Wildlife Commission's Nongame and Endangered Wildlife Program. "But with the current low population, illegal taking for the commercial pet trade is a prime threat. This federal listing will provide additional protection for the species."

Because most bog turtle habitat is on private land, federal and state wildlife agencies and conservation groups will work cooperatively with private landowners to find ways to protect the turtles. The Fish and Wildlife Service is not designating critical habitat for bog turtles because such designation can potentially increase illegal collection.

Since 1975, the Convention on International Trade in Endangered Species of Wild Fauna and Flora has monitored international trade in bog turtles, requiring permits for legal trade. However, significant illegal trade in bog turtles exists.

Though the southern bog turtle population is separated from the northern population by about 250 miles, the turtles look so similar that it would be difficult to enforce a prohibition protecting just the northern population. The new federal status prohibits collecting southern bog turtles and bans interstate and international trade of the animals. But it has no effect on land management activities of private landowners in southern states where bog turtles live. People who already legally possess bog turtles are also allowed to keep the turtles.

—Some information courtesy of the U.S. Fish and Wildlife Service

Lawrence Earley Named Editor of *Wildlife in North Carolina*

Longtime Wildlife Resources Commission employee Lawrence S. Earley has been chosen to head the Education Support Branch within the Commission's Division of Conservation Education. Included in his new responsibilities will be serving as editor of *Wildlife In North Carolina* magazine, coordinating the production of division educational publications and overseeing the N.C. WILD Store. Earley is replacing Jim Dean who retired in the fall.

Earley has been associate editor for the award-winning conservation magazine since 1980. He joined the Division of Conservation Education a year earlier as a part-time photographer.

Over the years, Earley has distinguished himself as a skilled conservation and natural history writer as well as an adept photographer. His monthly column "Nature's Ways" is likely his most familiar work to magazine readers. More than 200 of these natural history articles spanning nearly 20 years were recently republished by the Wildlife Commission in a six-volume set.

In addition to his magazine duties, Earley has served as the Conservation Education Division's publications coordinator for the past seven years where he has helped launch dozens of educational booklets, posters and videos.

"The Wildlife Commission has always played an important part in conservation education in the state, and *Wildlife in North Carolina* in particular plays a critical role," Earley said. "I'm really honored to become only the fourth editor of the magazine in the last half century."

In announcing Earley's appointment, Sid Baynes, chief of the Division of Conservation Education said, "The overall goals of *Wildlife in North Carolina* will remain the same. We want to maintain the publication's position as one of the top wildlife conservation magazines in the country and also to deliver the conservation message to broad new audiences, especially to young readers. We've already begun this in recent months by introducing a new section for children."

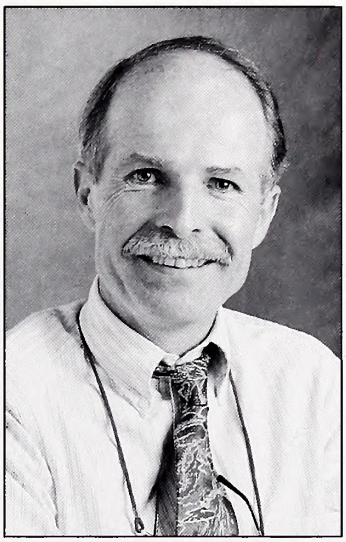
But Earley promises a lot of continuity in the magazine's editorial mix. "Sporting articles will continue to be essential parts of our formula, as well as pieces about wildlife and wild habitats, articles about conservation efforts around the state and plenty of North Carolina history," he said. "There's no doubt we'll miss Jim a lot, but I look forward to the educational challenge that lies before us."

Dean retired Oct. 31 after serving as the branch supervisor and magazine editor for more than 18 years. He worked for the Wildlife Commission for 28 years, starting in 1969 as a staff writer and photographer for *Wildlife in North Carolina*.

Though he played a major role in shaping the magazine, Jim is best known for his "Our Natural Heritage" column that appears at the beginning of each month's magazine. His unique blend of down-home humor and past fishing and hunting experiences has drawn a legion of loyal readers since he began writing the column in 1978.

Despite his retirement, Dean says he will continue to write his column and occasional feature articles as long as the fish let him. "This time off will allow me more time to write and take photographs for *Wildlife in North Carolina* and other magazines," Dean insists.

If we can just keep his fly-rods hidden come spring, we should have a steady flow of columns for many more seasons.



MELISSA McGAW

***Lawrence S. Earley** will serve as* Wildlife in North Carolina's *editor, replacing Jim Dean who retired in the fall.*

Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

Jan. 30-Feb. 1

The East Carolina Wildlife Arts Festival and North Carolina Decoy Carving Championships will be held at the Civic Center in Washington. The festival, sponsored by the East Carolina Wildfowl Guild, will bring together some of the nation's best wildlife artists, carvers and related exhibitors. Highlights of the weekend will include the state decoy carving championships and a wildlife art and decoy auction. The original painting to be used for the 1998 North Carolina Duck Stamp will also be unveiled at the festival. For more information, contact Show Chairman David Gossett at (919) 946-2897.

Feb. 13-15

The Southeastern Wildlife Exposition in Charleston, S.C., will feature more than 500 exhibitors and $20 million in wildlife art, decoys and collectibles. For more information, write the exposition at 211 Meeting St., Charleston, S.C., 29401, or call (803) 723-1748.

Feb. 27- March 1

The 18th annual Dixie Deer Classic will be held in the Jim Graham building at the North Carolina State Fairgrounds in Raleigh. The event is one of the nation's largest deer hunting expositions and draws thousands of hunters each year. For more information, call (919) 782-5333.

Bobwhite Quail Hunting Success Falls Again

KEN TAYLOR

North Carolina quail hunters posted *another dismal season last year, with the number of birds encountered per trip reaching a record low, according to the Wildlife Commission's Avid Quail Hunter Survey. The results confirm a long-term decline in Tar Heel bobwhite numbers.*

Tar Heel quail hunters posted another poor hunting season last year. The number of birds encountered per hunting trip reached a record low, according to the Wildlife Resources Commission's annual Avid Quail Hunter Survey.

Statewide, hunters who participated in the survey reported flushing 1.72 quail coveys per trip—an all-time low—down from 1.83 coveys per trip for the previous season. Wildlife biologists use the survey results to assess bobwhite hunting success trends and quail populations in North Carolina. In its 14th season, the survey has confirmed a continuing decline in Tar Heel quail populations.

During the 1996-1997 season, 157 hunters reported taking 2,581 hunting trips in 76 counties. They harvested 6,157 quail, or 2.39 birds per trip by their respective hunting party —down slightly from the previous season.

Quail-hunting success on the Coastal Plain showed continued decline with the steepest fall and the lowest success rates reported in the southern counties. Cooperators on the southern Coastal Plain reported 1.25 coveys per trip during 301 trips —an 18 percent decline from 1995-1996. Hunts reported from the central and northern Coastal Plain continue to have the highest success rates for the state with quail hunters flushing 2.17 coveys per trip for each region.

Quail encountered in the Piedmont per trip last season increased slightly overall with the southern counties reporting the highest flush rates of 1.57 coveys per trip. Few bobwhite hunts were reported in the mountain counties where hunters averaged 1.2 coveys per trip.

As in past seasons, North Carolina quail harvests peaked in November at the beginning of the hunting season. Success dropped during December and remained steady for the remainder of the season.

Wildlife Commission Schedules Nine Public Hearings

Sportsmen throughout the state will have the chance during the last two weeks of January and the first week of February to comment on proposed changes to hunting and fishing regulations for 1998-99 as the N.C. Wildlife Resources Commission holds public hearings on the proposals in each of the nine wildlife districts.

In addition to commenting on proposed changes, hunters and anglers will have the chance to submit proposals they would like the Wildlife Commission to consider in the future.

Hearings will begin at Sylva in the western section of the state on Jan. 20, swing to the central area the following week and end at Nashville on Feb. 4.

Staff members will present proposals for the 1998-99 seasons and members of the Wildlife Resources Commission will be present at each hearing. Each hearing begins at 7 p.m.

Below is the schedule for the public hearings:

- Jan. 20 - District 9 - Myers Auditorium, Southwest Community College, Sylva.
- Jan. 21 - District 8 - City of Morganton Municipal Auditorium, Morganton.
- Jan. 22 - District 7 - Starmount High School, Boonville.
- Jan. 26 - District 4 - Bladen County Courthouse, Elizabethtown.
- Jan. 27 - District 5 - Alamance County Courthouse, Graham.
- Jan. 28 - District 6 - N. Stanly High School, U.S. 52 north of Salisbury.
- Feb. 2 - District 1 - Swain Auditorium, Edenton.
- Feb. 3 - District 2 - Craven County Courthouse, New Bern.
- Feb. 4 - District 3 - Nash County Courthouse, Nashville.

—Bodie McDowell

N.C. Environmental Education Certification Program Receives National Award

The North Carolina Environmental Education Certification Program, co-sponsored by the Office of Environmental Education and the Environmental Educators of North Carolina, has been named winner of the first annual National Environmental Education Achievement Awards.

The awards, sponsored by the National Environmental Education and Training Foundation, recognize outstanding programs developed to increase balanced, science-based environmental education in schools. The achievement award for the North Carolina certification program was given in the category of "Integration of Environmental Education Into A School System."

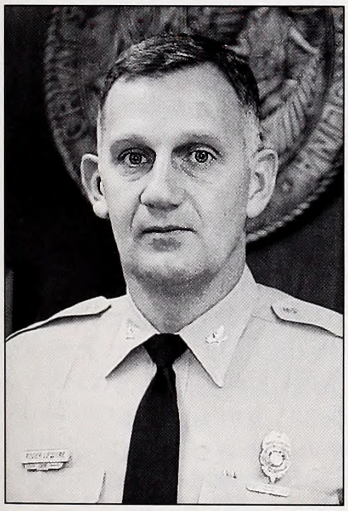
Through the certification program, Tar Heel educators who complete a required number of professional development experiences in environmental education are recognized and honored.

"The North Carolina Certification Program establishes standards of professional excellence for formal and non-formal educators," said Anne Taylor, Office of Environmental Education director. "National recognition of the program is a distinguished honor for the state and for those educators who complete the program requirements. This award confirms that those North Carolina environmental educators who complete this program are, as we suspected, the best in the nation."

The certification program was first proposed by employees of the N.C. Wildlife Resources Commission and the state Division of Forest Resources. N.C. WILD, the Wildlife Commission's popular conservation education program, is the first required course for certification. The first 25 certified environmental educators were recognized at the 1997 N.C. Environmental Education Conference held at Research Triangle Park.

For more information about the N.C. Environmental Education Certification Program, call Program Manager Mary Walter Rumley at (919) 946-6481. You may also visit the Office of Environmental Education's web site at **http://www.ehnr.state.nc.us/EHNR/ee**.

LeQuire Named Enforcement Chief



KEN TAYLOR

***Col. Roger LeQuire** heads the N.C. Wildlife Commission's enforcement division.*

Roger W. LeQuire, a 21-year veteran with the N.C. Wildlife Resources Commission, has been promoted from major to colonel to head the Commission's Division of Enforcement.

LeQuire succeeds Col. Robert M. Tatum who retired in December after 29 years with the Wildlife Commission.

As head of the enforcement division, LeQuire will oversee the operations of the Wildlife Commission's 208 wildlife enforcement officers who patrol all of North Carolina's 100 counties to ensure that the state's game, fish and boating laws are obeyed.

LeQuire, 46, began his career with the Wildlife Commission in 1976 as a wildlife enforcement officer assigned to Polk County. He has also served in Henderson, Transylvania and Surry counties. LeQuire has been promoted through the ranks in various supervisory capacities including serving as the Enforcement Division's training director, administrative operations major and field operations major.

"Col. LeQuire has earned the respect and confidence of all who have worked with him, and he has shown excellent leadership and management skills," said Charles Fullwood, the Wildlife Commission's executive director.

A native of Bryson City, LeQuire has three sons.

Field Notes

Gray Squirrel	Through Jan. 31
Fox Squirrel	See *Regulations Digest*
Rabbit	Through Feb. 28
Pheasant (Nonnative, males only)	Through Jan. 31
Fox	See *Regulations Digest*
Raccoon and Opossum	See *Regulations Digest*
Bobwhite Quail	Through Feb. 28
Ruffed Grouse	Through Feb. 28
Mourning Doves (third season)	Through Jan. 15
Common Snipe	Through Feb. 28
Crow	See *Regulations Digest*
Waterfowl	
Ducks, Mergansers and Coots	Through Jan. 20
Sea Ducks	Through Jan. 20
Snow and Blue Geese	Through March 10
Brant	Through Jan. 20
Youth Waterfowl Hunt Day	Jan. 24
Swan (by permit only)	Through Jan. 31

Information on bag limits, either-sex deer seasons and other regulations may be found in the *1997-98 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission. **For more information on waterfowl regulations and limits, call 1-800-675-0263.**

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through October 1997

Principal Balance
$24,350,541.04

Interest Earned
$24,312,913.99

Total Receipts
$48,663,455.03

Interest Used
$12,329,807.04

Fund Balance
$36,333,647.99

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Living with Endangered Species

by Rodney Foushee

Brown pelicans, American alligators, bald eagles—at one time all of these familiar Tar Heel species were considered endangered, likely to be wiped off the Earth without some serious help. Thanks to the heightened protection and awareness created by federal and state endangered species acts, pelican and alligator populations have recovered and been removed from the endangered list. The bald eagle, also in recovery, has been reclassified from endangered to a less serious status of threatened.

But dozens of other North Carolina plant and animal species still face possible extinction. Though often maligned, the federal Endangered Species Act, along with similar state laws, provides many lesser known species such as pitcher plants and bog turtles with a fighting chance at recovery. Whether great or small, all of these organisms make up the web of life and deserve saving.

Since many endangered species are found on private property, cooperation must exist between landowners and government agencies if there is hope of saving them. If a rare plant or animal species lives on your property, you have a unique opportunity and obligation. Based on your stewardship, the local population of the species may thrive or disappear.

A new booklet published by the Conservation Trust for North Carolina titled *Living with Endangered Species: A Guide for North Carolina Property Owners* is designed to dispel the myths and misunderstandings of owning property that contains an endangered species habitat. The 16-page guide explains the rights and responsibilities of Tar Heel landowners under federal and state law.

The guide also details available management assistance programs and how landowners can benefit from management subsidies and tax breaks by protecting habitats for endangered, threatened and rare species.

To receive a copy of the booklet, write the N.C. Wildlife Resources Commission, Nongame & Endangered Wildlife, P.O. Box 29613, Raleigh, N.C. 27626-0613, or call (919) 661-4872.

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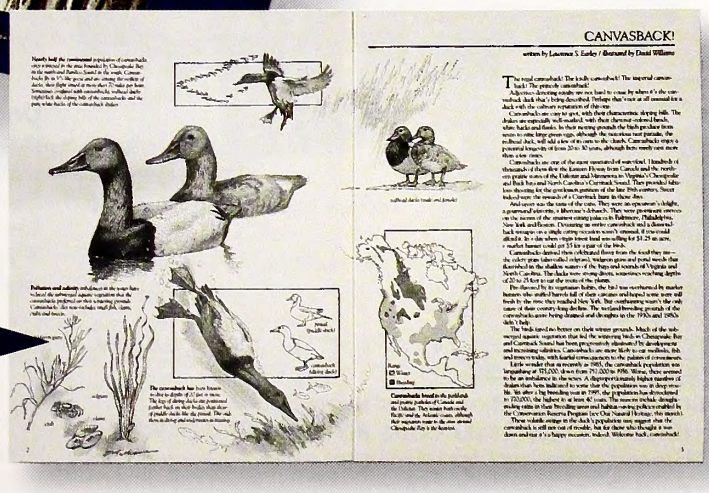

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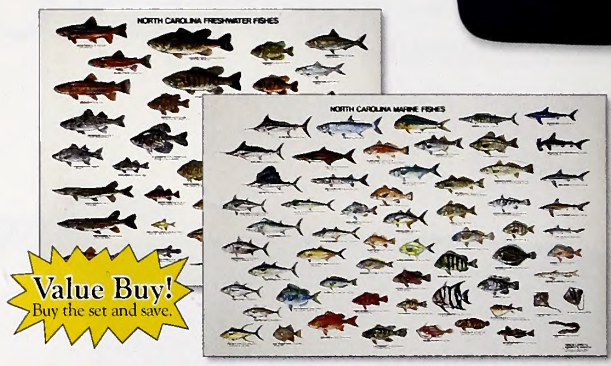

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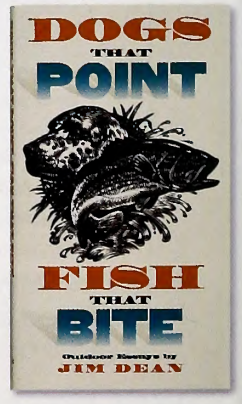

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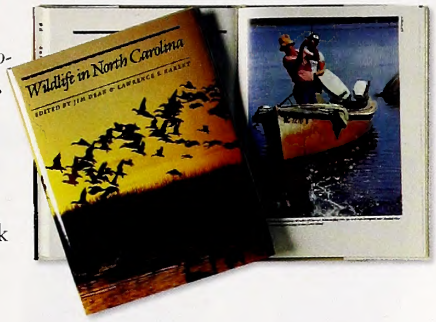

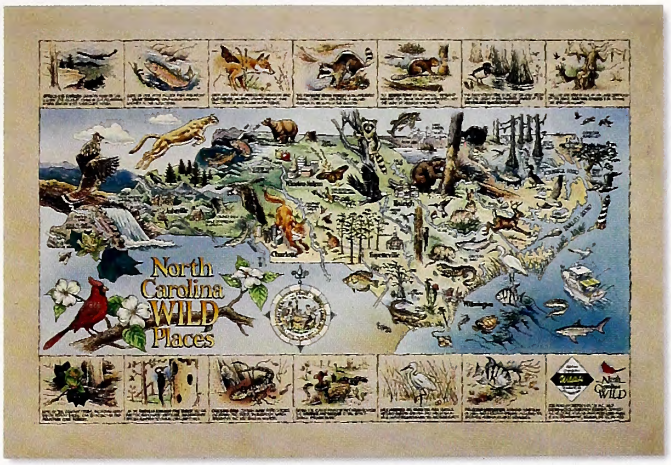

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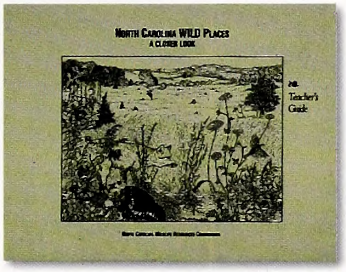

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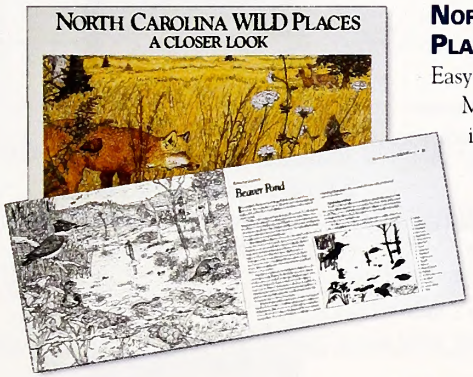

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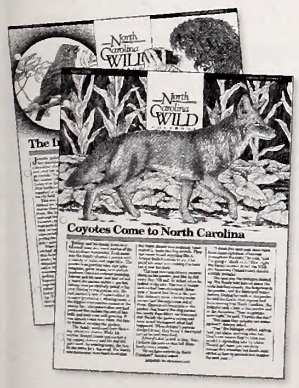

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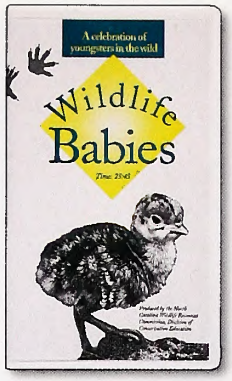

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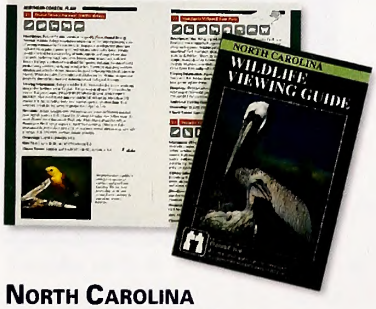

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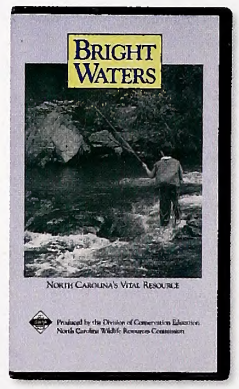

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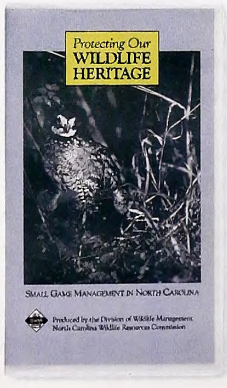

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ENDOW 98

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Check appropriate block and attach required copy

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Wildlife Commission Spotlight

Bill WHIPs Wildlife!

The main purpose of WHIP is to help landowners "develop upland wildlife, wetland wildlife, threatened and endangered species, fish, and other types of wildlife habitat."

KEN TAYLOR

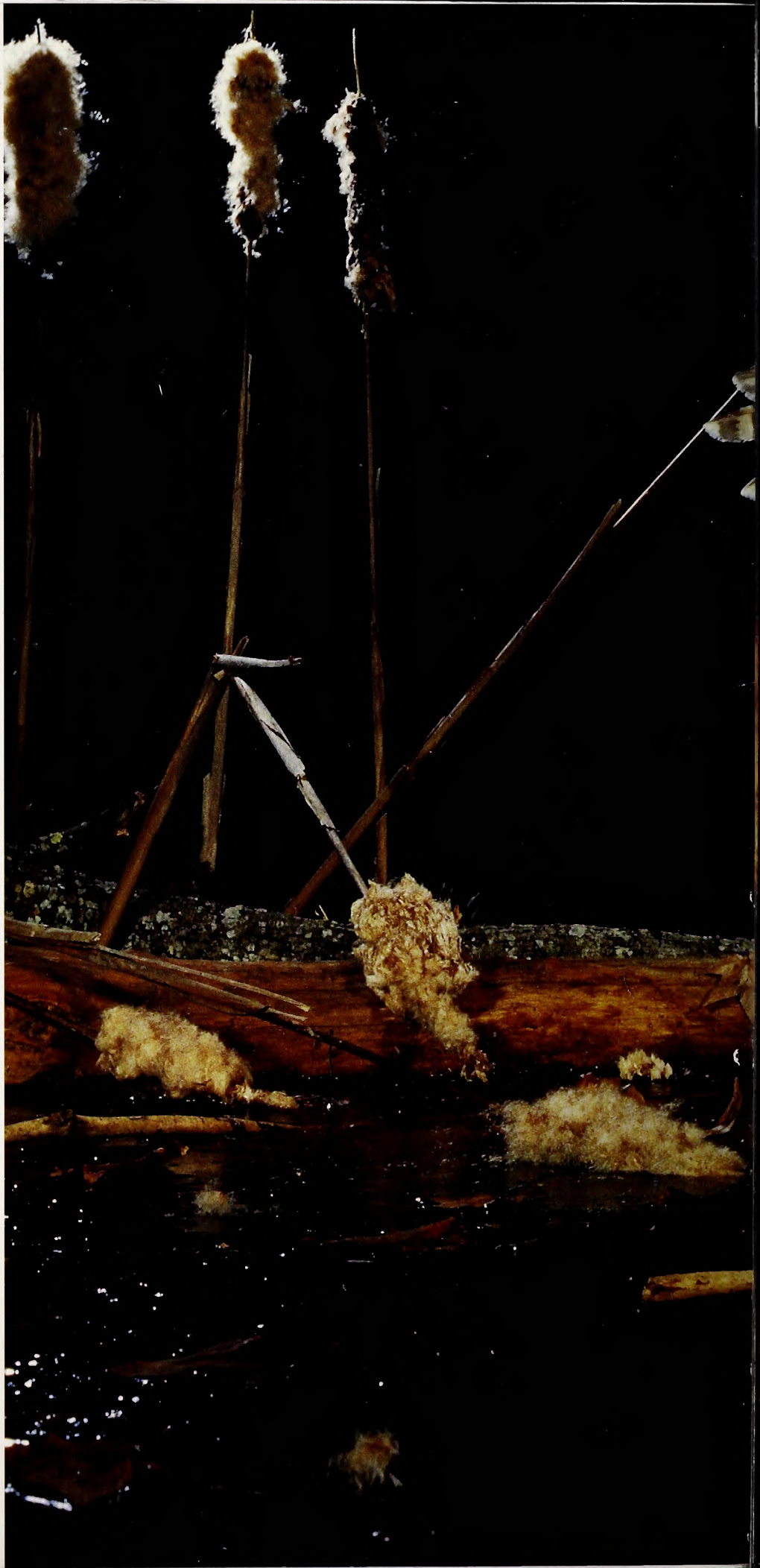
The 1996 Farm Act included several programs that can improve wildlife habitat on North Carolina farms. One of them is the Wildlife Habitat Incentives Program (WHIP) under the direction of the Natural Resources Conservation Service. The main purpose of WHIP is to help landowners "develop upland wildlife, wetland wildlife, threatened and endangered species, fish and other types of wildlife habitat."

KEN TAYLOR

Through WHIP, cost-share assistance is made available to landowners who wish to integrate wildlife considerations into the overall management of their operations or who simply desire to do more for wildlife. The Conservation Service will implement WHIP in harmony with other programs to accomplish wildlife objectives more comprehensively.

As participants make decisions about the wildlife habitat development plan for their land, they will gain a greater awareness about the diversity of wildlife needs. They will also learn how wildlife management can fit into their farming or ranching activities. The Conservation Service believes that the efforts made by participants in this program will serve as a catalyst for improving wildlife conditions throughout the nation.

For more information, contact the local offices of the Natural Resources Conservation Service and Farm Service Agency, or your local district wildlife biologist.



Frozen in Time

Braked by its outspread wings and tail, a barred owl lands in a winter pond. For more of Derrick Hamrick's spectacular stop-action wildlife photos, see p. 20.

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WILDLIFE IN NORTH CAROLINA

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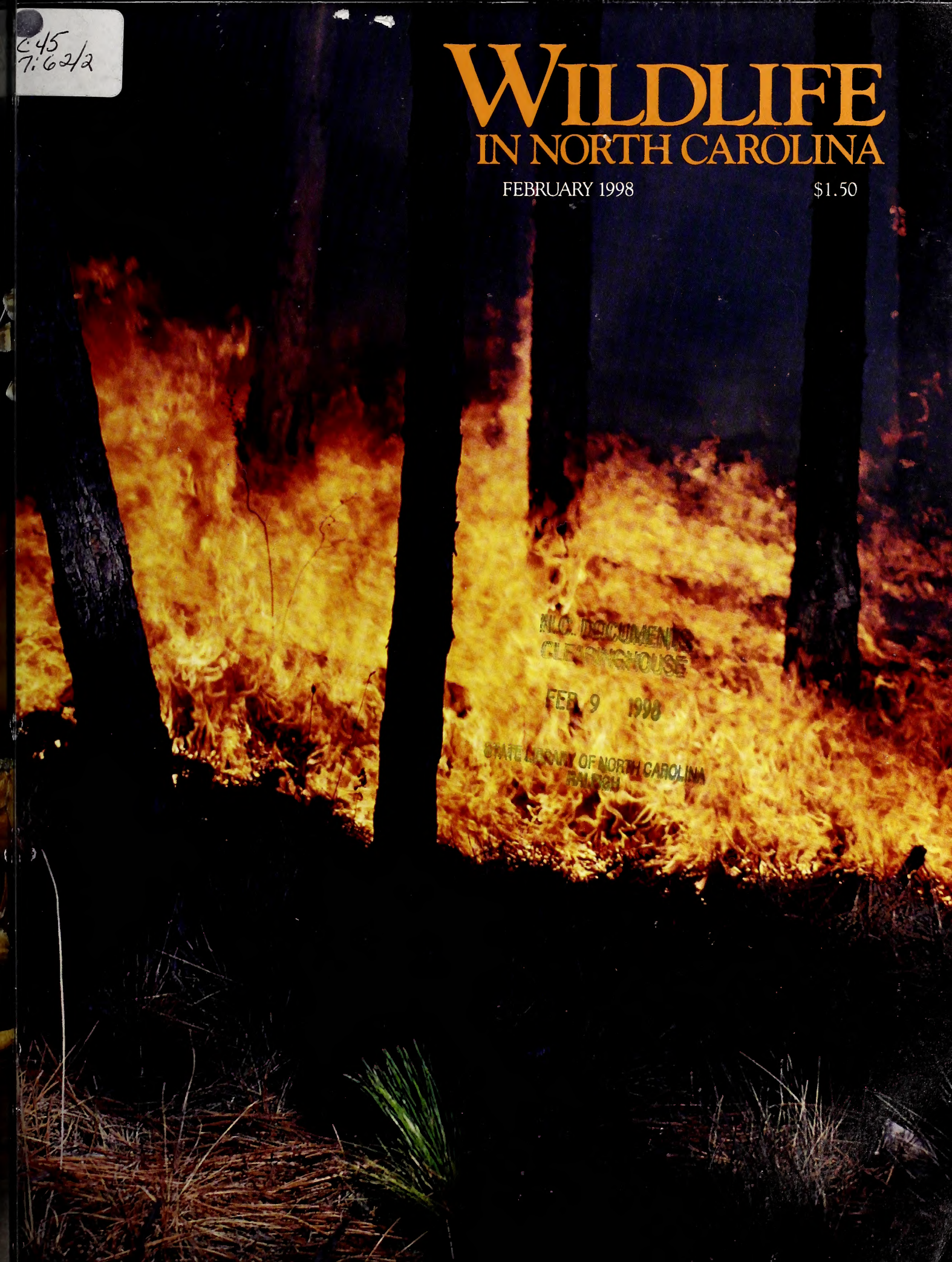

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Collections Out of Control

by Jim Dean ©1998

ILLUSTRATED BY JACKIE PITTMAN ©1998

Have you priced any early hand-made waterfowl decoys lately? How about older double-barrel shotguns? What about fishing lures, reels or custom-built cane fly rods made before the 1950s? Sporting calendars, books, knives, license buttons? Unless you're already familiar with the values currently being assigned to these and countless other items of older hunting and fishing gear and associated memorabilia, you will be stunned at the prices being asked—and sometimes paid—for some of this stuff.

Not long ago I was at a show where some high-dollar duck decoys were being sold and was told by a collector that the best buy in the bunch was not one of the common Susquehanna Flats battery decoys at $500, or even one of the Outer Banks primitives at three times that price. It was a $20,000 decoy in original paint that had been carved by a well-known but underappreciated carver in the 1930s. It was, said my advisor, seriously underpriced.

"How seriously?" I asked.

"I'd say by at least half, possibly more," he replied. "That carver's skill is going to be recognized someday soon, and the price is going to skyrocket. Then, the value will depend on the buyer."

I very carefully put it down since I did not want it to depend on this particular buyer.

Over the past 20 years—and especially since the mid-1980s—well-heeled aficionados of sporting memorabilia have gone nuts collecting all the things that remind them of the golden age of hunting and fishing. Certainly, much of it deserves to be collected and preserved because it was beautifully made with careful handwork and a level of craftsmanship that approaches art. Even early commercially manufactured items often show remarkable design, skill and high-quality materials that give them great appeal.

"Over the past 20 years...well-heeled aficionados of sporting memorabilia have gone nuts collecting all the things that remind them of the golden age of hunting and fishing."

While all this interest has undoubtedly preserved many of these items for future generations—items that might otherwise have been tossed out in the trash—it is cause for some sadness, too. In the first place, when something generates interest and demand among collectors, it is a pretty good indication that the sport itself is in decline. We spend big bucks to set up museums full of memorabilia to honor our waterfowl heritage along the coast when we could be using that money to help preserve the marshes and sounds that still support that resource.

Furthermore, the outlandish rise in values—much of it purely for investment rather than for love of the sport—dooms the casual collector who simply likes to have a few of these things around to enjoy. Who can afford to go bass fishing with a lure his grandfather left him after he finds out it's worth $50—possibly a lot more? Those who collect rare knives don't even sharpen them for fear of reducing their value, and if you hunt with that old 20-gauge A-grade Parker double or fish with a Garrison cane rod, you're risking the price of a college education at a private school.

Because investors have rapidly replaced true collectors, they have driven values to outrageous levels. We're shocked to discover that items someone may have given us 10 years ago now command such high prices that we are uncomfortable owning them. And since everyone seems to have "heard" about these values, they put big prices on things that are still virtually worthless. Just recently, I saw a pile of beat-up plastic crankbaits at a flea market. Each lure was tagged at $20, even though you could go next door to Kmart and buy a new, identical one for less than $5.

Those lures may never be worth more than retail, and certainly not for years. Indeed, many old sporting items still have little value. Most bamboo rods, for example, were mass-produced and are worth very little.

If you own sporting collectibles that you think may be valuable, my advice is to have them appraised and insure them. Then, look for some other avenue to vent your collecting mania. Of course, I'm at a loss to suggest what you might substitute. At an antique tackle show, I recently saw a cased collection of tin split shot boxes. You don't want to know how much the owner figured they were worth.

It all reminds me of the story of the fellow who told his friend that he owned a dog that was worth $10,000.

"How do you figure he's worth that much," said his friend.

"Well, that's easy," was the answer. "I traded two $5,000 cats for him."

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Contents

Wildlife in North Carolina

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and also to the environment we share with them.

February 1998 *Volume 62, Number 2*

Features

4 **Buzzbait Bassin'**
written and photographed by F. Eugene Hester ©1998
When conditions are right, a buzzbait can produce some fast and furious bass fishing. Warning: You may need a strong heart to stand the excitement.

page 4

8 **Burning Issues**

The Sandhills Quail Mystery *written by Terry Sharpe* 9
Were the aerial photos really out of focus, or was their fuzzy quality telling biologists something important about quail declines in the Sandhills?

The Swamp That Burns *written by Lawrence S. Earley* 13
Though water nourishes the vast pocosin wetlands of our outer coast, fire plays a critical role in maintaining and restoring them.

The Fire Next Time *written by Lawrence S. Earley* 19
There's a consensus today that southern habitats need more fire, not less. Do we have the will to make that happen?

page 8

22 **Girl Scouts Go WILD** *written by Celeste Wescott*
When Girl Scout leaders use N.C. WILD and N.C. CATCH activities to enrich their programs, the results are worth the effort.

24 **Mapping the Future for Songbirds**
written by Rodney Foushee
photographed by Melissa McGaw
With many songbird populations in steep decline, North Carolina biologists are teaming up with bird enthusiasts nationwide to gather data about these feathered wonders.

page 24

Departments

Our Natural Heritage *by Jim Dean* ©1998 .....**inside cover**
Nature's Ways *by Lawrence S. Earley* 2
N.C. WILD Notebook *by Consie Powell* ©1998 28
Back Porch *by Rodney Foushee* 32
Wildlife Through the Year *by Rodney Foushee* 36

Cover *A prescribed fire on the Sandhills Game Land produces food plants for many game and nongame species. Photograph by Jane Rohling.*

Wildlife in North Carolina (ISSN 0043-549X) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N. C. and other offices. Subscription rates: one year $7.50, three years $20, Lifetime $100. For subscriptions from foreign countries, payment **only** by U.S. Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks for new subscriptions or change of address. POSTMASTER: Send address changes to Circulation Manager, *Wildlife in North Carolina*, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, call 919-662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the N.C. Wildlife Resources Commission. *Wildlife in North Carolina* is available on cassette tape as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., 1-800-662-7726. **The N.C. Wildlife Resources Commission is an equal opportunity agency.**

The Cattail's Savory Success

written by Laurence S. Earley
illustrated by David Williams

Life processes in the cattail marsh may be slowed in winter, but they're certainly not stopped. In February the upper stalks are brown and the plant looks dead, but in this most unpromising season the cattail (*Typha latifolia*) is gamely banking on a spring revival.

Note the mallard, leaving its footprints along the muddy pond edge. On its foot, entombed in a dried piece of mud, behold the cattail's seed. Now watch as the duck flies from this pond and splashes into another wetland nearby. The muddy seed washes off and, like a tiny immigrant, floats to shore where, in the spring, you might find a green shoot emerging.

The tiny seedling is a long way from the 9-foot stalk that will grow, but the process has begun. By June the cattail's flower consists of a 2- to 3-inch fuzzy spike sitting atop the green female part. Containing the plant's male parts, the spike sheds airborne pollen that fertilizes the female parts of other cattails. As summer passes into fall, the male parts fall off and the fertilized female parts begin to take on the look of a fat, brown cigar or punk. Some people also compare it to a cat's tail, which gives the plant its name.

As winter nears, the solid-looking punk begins to disintegrate, forming a fluffy seedhead containing tens of thousands of seeds. Each seed is equipped with a tiny hair enabling it to float away on autumn's vagrant gusts. A bird or other animal may also unwittingly play a role in the seed's dispersal. By whatever means, the seeds are carried away from the parent plant and a new colony is begun.

Like many perennial plants, the cattail has perfected two means of reproducing—by seed and through vegetative means. The seed produces a rhizome, a horizontal stem just below the ground surface. While winter kills back the stalks, the rhizome is still alive, packed with nutrients that will send forth new stalks in the first flush of warm weather. Each rhizome lives several years, and each year new stalks are produced at the tip of the rhizome.

The cattail's seed is mostly the plant's way of ensuring new colonies elsewhere. The seeds will not germinate where the parent plant grows, but with their ability to put forth new stalks each year, the rhizomes by themselves can maintain and even expand the colony.

Indeed, colonization is something that the cattail can do very well. In some northern prairie states, the narrow-leaved cattail (*Typha augustifolia*) has become an aquatic pest, filling in wetlands and reducing the open areas needed by nesting ducks and other wildlife. In North Carolina, duck hunters can name several favorite beaver ponds that have changed from open water to a solid cattail marsh in a suprisingly short time. In time, sediments trapped by the plants' stalks will change the marsh into an upland habitat.

Despite these drawbacks, cattails provide nutritious food and welcome habitat for many wildlife species. Canada geese fatten on the rhizomes, and birds—red-winged blackbirds, marsh wrens, bitterns, rails and gallinules, among others—build their nests among the stalks.

Benefitting the most from the success of cattails is the muskrat. Like the Canada goose, the muskrat also eats the rhizomes and it uses the upper stalks of the cattail to build its shelter. On a base constructed of mud and branches, it piles cattail leaves and continues to add mud, slowly erecting an island house in which to live.

And even at this coldest time of year, the old, dried stalks of a cattail marsh may well be sheltering other creatures—the marsh rabbit, for example, or even an occasional cottontail. Wild turkeys have sought shelter from February's piercing blasts within the ranks of broken husks, only one of many creatures that find some measure of life in the cattail marsh.

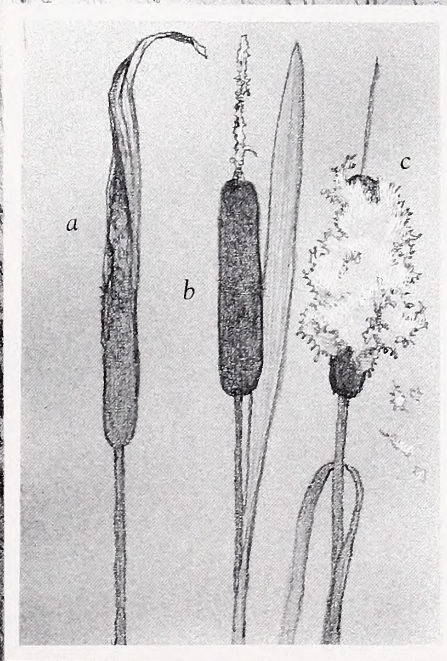
Other Reading

- Janine M. Benyus, *The Field Guide to Wildlife Habitats of the Eastern United States* (Simon and Schuster, 1989).
- Doug Elliott, "Swamp Dancers," *Wildlife in North Carolina* (April 1993).
- Donald and Lillian Stokes, *A Guide to Enjoying Wildflowers* (Stokes Nature Guides, 1985).

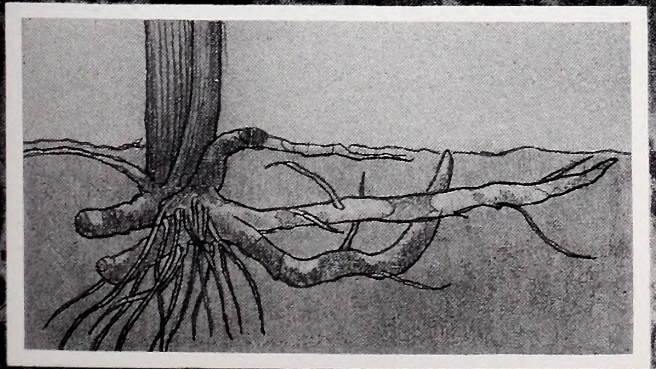
Surfing the Web

- The Cattail Management Symposium was held in Fargo, N.D., in February 1992. For information from this symposium on the effects of cattails on wildlife see *Address:* http://www.npsc.nbs.gov/resource/othrdata/cattail/kantrud.htm
- At NativeTech, you'll find many creative uses that Native Americans made of cattails, as well as other aspects of Native American technology and art. *Address:* http://www.lib.uconn.edu/NativeTech/cattail/index.html

***In the raucous freshwater** marsh fringed by cattails, resident Canada geese, muskrats and a bevy of nesting birds seek food or cover. The geese and the muskrats eat the cattails' underground stems, or rhizomes, while marsh wrens (inset box, bottom left) and red-winged blackbirds attach their nests to cattail leaves.*



***The round stalks** emerging from the cattail's leaves are tipped with male and female parts (a). The pollinated female parts look like a thick brown cigar (b). The lighter-than-air seeds float away from the fluffy seedhead in fall (c).*



***The cattail is a perennial plant.** Though the stalks above ground die back in winter, the cattail's rhizome is alive, packed with nutrients for a spring growth burst. New stalks grow from the tip of the rhizome.*

BUZZBAIT BASSIN'

When conditions are right, a buzzbait can produce some fast and furious bass fishing. Warning: You may need a strong heart to stand the excitement.

written and photographed by F. Eugene Hester ©1998

What would you call an eggbeater wired to a lead-head fish hook with a plastic skirt? A buzzbait, of course. This unusual combination makes a special lure designed to run at the surface and create as much commotion as possible. The amazing thing is that it works. It catches bass, and often they are big bass.

As buzzbaits run across the surface, they are not only noisy, but they stir up waves and a lot of bubbles. If motion in a lure convinces a bass that the lure is alive, then a full-speed buzzbait must look like a lively critter running at top speed across the water. Maybe it seems like a frightened frog skipping across the surface, or a duckling running for cover.

Regardless of what it might look like, the scurrying action of a buzzbait triggers an instantaneous reaction in a bass. It must grab the lure instinctively or it may be gone forever. This impulsive response, and the predatory instinct of the bass seems to say "Get it! Get it now!"

I think the reaction is like the one you get when you ride a bicycle in front of a yard dog. If you walk the bicycle, the dog shows little interest. But if you come riding by at full speed, the dog will jump into overdrive with determination to catch the bicycle. So it is with a bass. If a lure comes by slowly, the bass watches it and decides whether or not to hit it. But run a buzzbait by a fish at full speed and it presents an almost irresistible challenge.

***Despite its unusual** design, a buzzbait when properly fished on the surface can trigger an explosive strike unrivaled by most other bass lures.*

Fishing a buzzbait requires a spinning or casting outfit with a moderately stiff rod and a reel that can retrieve line fast. It takes some serious cranking to keep the buzzbait on the surface and make it work effectively. I prefer a 6-foot medium-action, graphite casting rod with a baitcasting reel spooled with 20-pound test low-stretch line. A reel with a 6.2:1 gear ratio provides both a fast retrieve and good cranking power.

This is reasonably heavy-duty equipment. It is necessary though, because you need power to keep that buzzbait on the surface. The best places to use a buzzbait are in thick stumps, logs and other vegetation, where you need to muscle a bass away from potential hang-ups.

I first learned of buzzbaits 40 years ago. Vernon Oglevie was not only an enthusiastic bass fisherman, but a creative maker of homemade buzzbaits. He cut aluminum pots and pans to make the propeller blades and then wired all the parts together. He used them in his bass fishing each morning and afternoon. They worked, and he caught plenty of nice bass. While experimenting with new designs, he probably created some models similar to those now widely available.

Although the basic buzzbait is simple with a large rotating propeller blade, wire shaft and skirted lead-head jig, there are many variations. Plastic propellers are popular, but aluminum propellers are also sold. Some buzzbaits have two-bladed propellers; others have three or four. One model even has a propeller within a propeller, rotating in opposite directions.

Some buzzbaits have trailer hooks for catching fish that strike short, or a special "clacker" to increase noise by striking the rotating propeller. In others, propeller blades strike the wire shaft. Variations include an off-center propeller to create more wobbling, waves and noise, and holes in the propellers to create more bubbles.

A quick glance through a typical bass fishing catalog can easily reveal a dozen or more buzzbait models in a variety of colors and weights. Most models have propellers that run on the surface with the hook and skirt offset a few inches below and behind. Others are in-line models with the hook directly behind the propeller, a feature that makes them even more snag resistant in weeds. There are also hybrid lures such as the Sputterbug and Top Prop that use buzzbait features.

Most buzzbait fishermen agree that anything that causes the bait to be noisier and more active will improve it. Some say buzzbaits get better with age as parts wear or get out of alignment. Experienced buzzbait fishermen are enthusiastic about a lure that squeaks, or one that runs erratically.

Buzzbaits sometimes will not come

straight back when retrieved; they sweep to the right or left. That is great, since the bait runs behind, against and around trees or stumps. It also enables lures to run under boat docks. This puts the noisy lure directly over bass lying next to such structure and right into what most anglers recognize as the strike zone.

Last spring, I fished with my nephew, Rupert Hester, in an old millpond near Wendell. We had been casting Rebel lures and plastic worms along the shore and among the little islands and stumps at the head of the pond. It was a beautiful morning, and the water seemed perfect. The bass, however, were not cooperating. We were confident that it was a great bass lake, but we were simply not catching them. We had been fishing since daybreak and by mid-morning we had just two small bass to show for our efforts.

When fishing is this slow, our standard encouraging thought is to remember that one 5-pound bass can turn a trip into a successful one.

"Time to wake up a bass," I told Rupert.

"How can you do that?" he asked. Then he watched as I slowly tied on a buzzbait. "I have a couple of those things, but I never have caught much with them," he said.

I worked the buzzbait across the shallow water, running it across logs and as close to stumps and bushes as possible. It made quite a commotion and really looked inviting on the calm pond surface.

Within five minutes I had an explosive strike and a few minutes later a second one. Without saying a word, Rupert began tying on a buzzbait. It was a dark, 3/8-ounce lure that made plenty of noise as he worked it across the pond surface. Soon, he was casting it into little openings between stumps in water about 3 feet deep.

Suddenly, a bass grabbed the buzzbait only a few feet from the boat. The action was fast and furious. The fish made dramatic jumps and splashed us with water.

Rupert was soon lifting the magnificent bass into the boat. He admired the 5-pound beauty and with a great smile turned to me and said "This one sure made this a successful trip."

My experience has been that most fishermen have a buzzbait or two stashed away somewhere near the bottom of their tackle boxes. They have tried one a couple of times briefly without success and essentially abandoned it. If you judged any lure by what it produced the first couple of times you fished it for a few minutes, most would be regarded as unproductive. Buzzbaits deserve a more realistic evaluation.

Joe Smith of Zebulon is the most committed buzzbait fisherman I know. He uses buzzbaits almost exclusively and has learned plenty about fishing them. He especially likes to fish buzzbaits when the water is calm and slick. He's convinced me that there is much more to fishing a buzzbait than just casting it out and cranking it in.

Joe has learned how to modify lures to make them run to the side, rather than straight back. This way they run behind and around stumps, right over the top of a waiting bass. By having lures that run to the side, Joe is also able to fish them under bushes.

"When it runs under an overhanging bush, if he doesn't strike it, he's not home," Joe said. He has learned a lot of techniques to get strikes and has developed confidence in the lures.

***Buzzbaits come in** a variety of colors and sizes, but it's their noisy propeller blades that separate them from other lures.*

The Little River Wildlife Club has a friendly fishing competition one weekend each month. Joe often wins the contest. He told me about winning a contest last April.

"That day I had my limit of nice bass averaging over 3 pounds by mid-morning, and had released smaller bass as big as 2 1/2 pounds," he said. "Buzzbaits trigger strikes, not because bass are hungry, but because you agitate the bass by running that noisy bait over the top of him," Joe said. "Rarely will a bass strike at a buzzbait twice, so I have a second rod rigged with a plastic worm that I cast to a missed strike."

To win a tournament, you need at least one really nice bass called a kicker. "One of the bass needs to be over 4 pounds, and a 7-pounder is great," he said. Joe has caught four bass over 7 pounds with buzzbaits.

He uses 17-pound monofilament line and believes lure color is not important except on dark or cloudy days when a black model works best.

"The more noise it makes, the better I like it," Joe said. The more the hole around the propeller shaft gets worn, the more the propeller wobbles, creating more waves, noise and bubbles. Some fishermen break a buzzbait in by tying it to the truck antenna and letting it rotate in the wind while driving down the highway.

"A buzzbait is good all day long, not just at dawn and dusk," Joe said. "I catch bass at mid-day by running the bait under overhanging bushes. I also cast it right into stumps and cypress trees. That's where the bass are." Joe's enthusiasm for the buzzbait is obvious. "I like the explosion," he said.

A buzzbait can be effective any time that bass are willing to strike on the surface. For most places, that means the warmer parts of the year, from March through October.

There are a lot of techniques for fishing a buzzbait. One method keeps the buzzbait from sinking immediately after it hits the water. Just stop the outgoing line with thumb pressure on the spool just before the lure hits the water. Then, as the lure retrieve is started, sweep the rod to tighten the line and keep the lure near the surface.

No lure is the right lure for all times and places. Sometimes slow action is the best way to fish. At other times very small lures work great. Sometimes the subtle action of a soft plastic lure crawled slowly across the bottom works best.

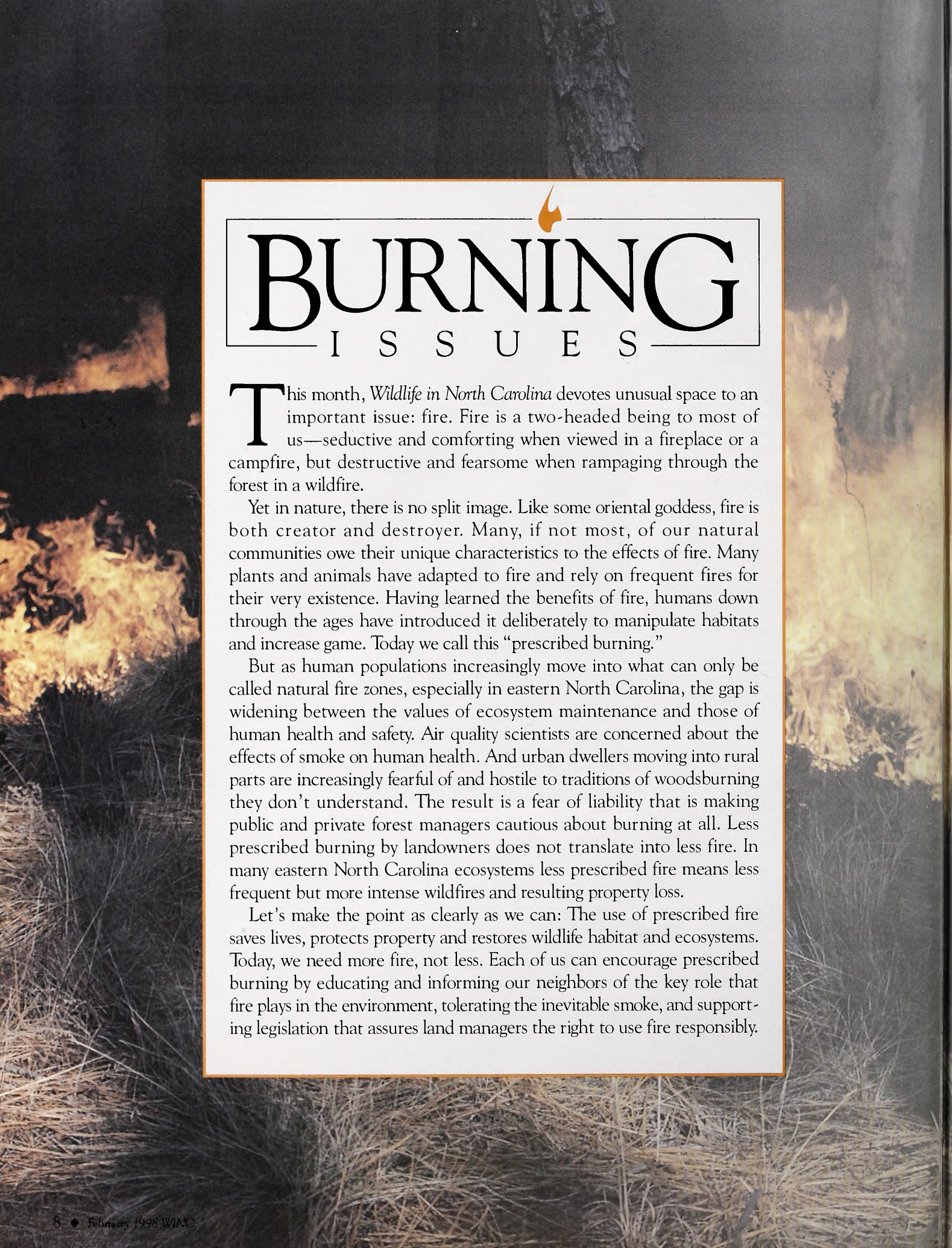
But there are times and places when the buzzbait is the right lure. Some good indications of the right time are warm water, calm surface, overcast days, dawn and dusk. But the best indication is given by the bass themselves. Work a buzzbait near good cover in shallow water and a bass will soon let you know if the conditions are right.

Fishing buzzbaits is different from fishing other lures. You should not judge them too quickly. They deserve to be given a good workout around heavy cover.

Maybe you should check with your doctor before you start fishing buzzbaits to make sure your heart can stand the excitement. Strikes are without warning and are likely to be the most explosive that you will ever experience.

And once you've sunk the hooks into a few nice bass, you will definitely want to make room in your tackle box for more buzzbaits. ☒

***A fast-moving buzzbait** fished around stumps and bushes can be irresistible to bass lurking below the surface. The noisy topwater lure takes full advantage of the fish's predatory instinct to grab escaping prey.*



BURNING ISSUES

This month, *Wildlife in North Carolina* devotes unusual space to an important issue: fire. Fire is a two-headed being to most of us—seductive and comforting when viewed in a fireplace or a campfire, but destructive and fearsome when rampaging through the forest in a wildfire.

Yet in nature, there is no split image. Like some oriental goddess, fire is both creator and destroyer. Many, if not most, of our natural communities owe their unique characteristics to the effects of fire. Many plants and animals have adapted to fire and rely on frequent fires for their very existence. Having learned the benefits of fire, humans down through the ages have introduced it deliberately to manipulate habitats and increase game. Today we call this "prescribed burning."

But as human populations increasingly move into what can only be called natural fire zones, especially in eastern North Carolina, the gap is widening between the values of ecosystem maintenance and those of human health and safety. Air quality scientists are concerned about the effects of smoke on human health. And urban dwellers moving into rural parts are increasingly fearful of and hostile to traditions of woodsburning they don't understand. The result is a fear of liability that is making public and private forest managers cautious about burning at all. Less prescribed burning by landowners does not translate into less fire. In many eastern North Carolina ecosystems less prescribed fire means less frequent but more intense wildfires and resulting property loss.

Let's make the point as clearly as we can: The use of prescribed fire saves lives, protects property and restores wildlife habitat and ecosystems. Today, we need more fire, not less. Each of us can encourage prescribed burning by educating and informing our neighbors of the key role that fire plays in the environment, tolerating the inevitable smoke, and supporting legislation that assures land managers the right to use fire responsibly.

The Sandhills Quail Mystery

Were the aerial photos really out of focus, or was their fuzzy quality telling biologists something important about quail declines in the Sandhills?

written by Terry Sharpe

MELISSA McGAW

Good hunting *rewarded Sandhills bird hunters for many years until the 1970s, but since then hunting success has plummeted. The decline in quail populations in the region has long puzzled wildlife biologists. Reduced fire frequency is among several factors that may explain this problem.*

In the early 1980s, Norman Lantz, then the Sandhills Game Land forester, ordered a brand new set of aerial photographs of the game land. A forester lives and dies by his aerial photographs. Norman knew the Sandhills Game Land by heart and could read the most minute features about the timber stands and their condition from his photos. But his excitement quickly faded as he pored over the new photos, scanning familiar areas, following timber stands, stream courses and trails only evident to one intimately familiar with the area.

"These new photos are out of focus," Norman said. "Our old photos are much clearer." The new photos were fine for delineating new fields and determining timber types, he found, but whenever he needed to locate some obscure landscape detail and especially trace one of the many Sandhills stream courses, or drains as he calls them, Norman would pull out the old set of photos. We were disappointed that the U.S. Geological Survey seemingly was selling us photos that were not properly focused.

At the time, we had no idea that the fuzzy photos held the answer to one of the major Sandhills wildlife mysteries—the mystery of the Sandhills quail decline. Harvest records show that hunters on both the Fort Bragg Military Reservation and the Sandhills Game Land had excellent success locating quail through the early 1970s. Since then, the quail situation hasn't been so rosy. Following a rather steady long-term decline, hunters now harvest about one-tenth as many quail on Fort Bragg and the Sandhills Game Land as in the heyday.

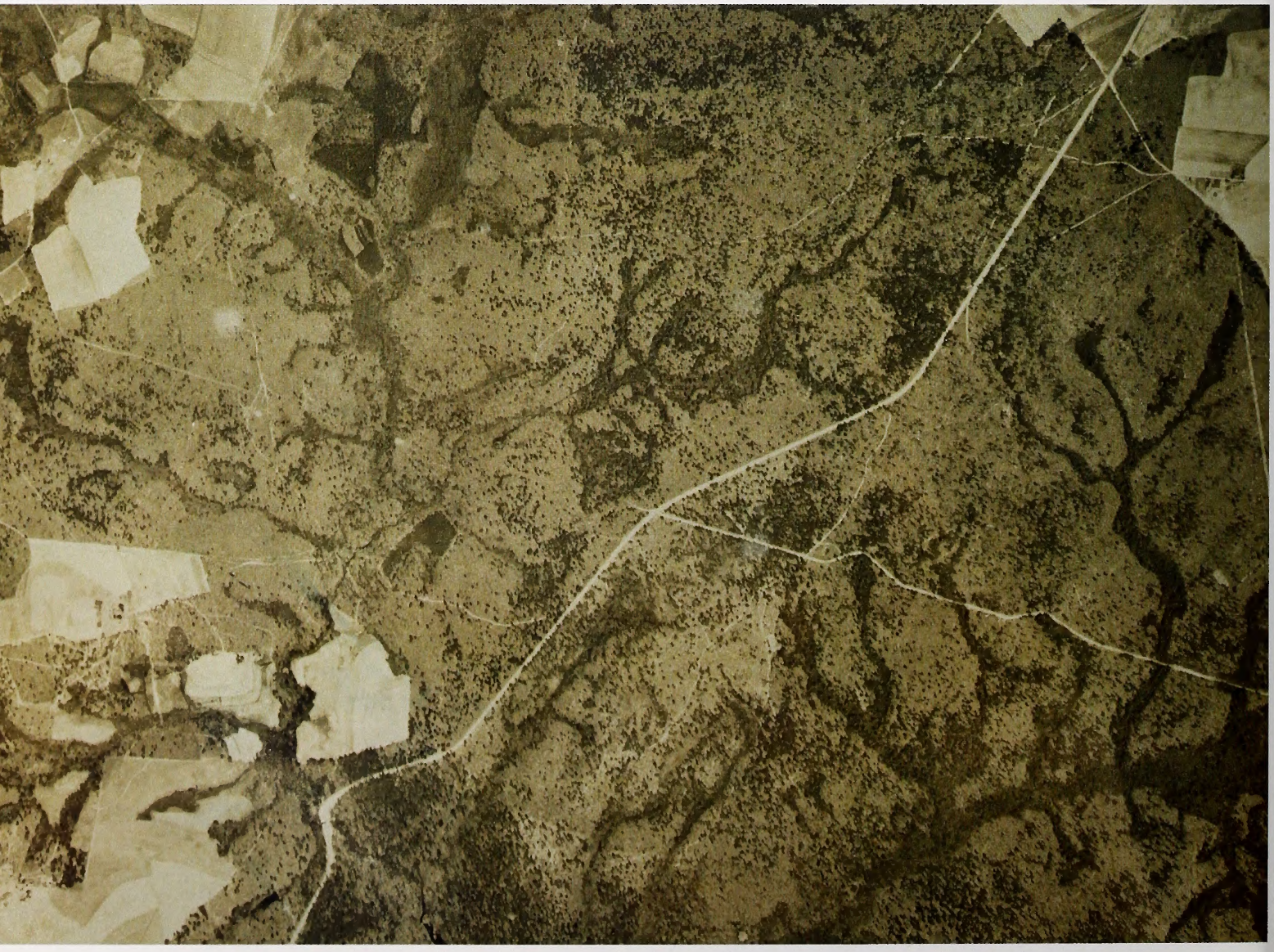
Over the next few years as I followed bird dogs, studied years of data collected from hunters and field trialers, and participated in quail research projects on the Sandhills Game Land and nearby Fort Bragg, I pondered the quail problem. Because I work with small game and live in the Sandhills, hunters frequently ask me why there is no longer an abundance of bobwhites in the longleaf pine/scrub oak forests of the Sandhills. The vast longleaf forests of the Sandhills Game Land and Fort Bragg—half a million acres—have not experienced many of the major problems which are blamed for quail declines in other

areas. The forests have always been dominated by longleaf and scrub oaks, agriculture has not been a dominant land use, and pesticide use has been insignificant. Many hunters feel that the vast unchanged area of the Sandhills is living proof that some mysterious factor is decimating quail populations. Based on my research and ramblings through the Sandhills forest and elsewhere, the question I pondered was somewhat different. Instead of wondering what has happened to the quail, I kept asking myself, "How did the Sandhills longleaf forests *ever* support an abundance of bobwhites?"

It didn't make sense. I was familiar with good forest quail habitat from my visits to the celebrated quail plantations of South Carolina, Georgia and Florida. These productive quail habitats offer a lush and diverse growth of low weeds and grasses, an abundance of insects, and a lot of legumes. But the Sandhills has poor soils and few agricultural fields. The sparse growth of wire grass, leaf litter and the brushy characteristics of Sandhills drains didn't fit into the equation that equaled quail abundance. What conditions could have cranked out the high numbers of bobwhites that the Sandhills once enjoyed?

I admit that I'm a worrier and the fact that the quail population had declined so steeply without an apparent cause bothered me. All the possibilities ran through my mind: disease, predators, weather cycles, acid rain, timber harvest changes. What could have happened to influence the vast longleaf pine forests of Fort Bragg and the Sandhills Game Land? Like Norman's new photos, the quail picture wouldn't quite come into focus.

As time passed, researchers made progress in unraveling the quail puzzle. Fort Bragg supported research under the direction of Dr. Phil Doerr, zoology professor at N.C. State University, which documented many aspects of quail life history in the Sandhills and hinted at the problem. Researchers Paul Curtis and Fred Robinette worked with Dr. Doerr to document that Sandhills quail



U.S. DEPARTMENT OF AGRICULTURE

***In 1950, this aerial** photograph of the Sandhills Game Land reveals an open landscape in which individual longleaf pine trees are visible. The openness was maintained by fires that spread every several years across this landscape and into the forested drainages. This kind of open landscape is a quail paradise, producing plants that nourish quail and their young.*

were wanderers, covering a much larger home range than bobwhites on managed landscapes. On the bright side, the researchers learned that quail have an unprecedented reproductive potential. One hen, by mating with and soliciting help with incubation and brooding from multiple males, had the potential to produce not one brood per summer but at least three. The research also questioned many of our traditional views concerning hunting seasons, the value of small food plots and the influence of predators on quail populations.

I assisted the quail researchers trapping and marking during several field seasons. Each evening before checking quail traps, we gathered in the Fort Bragg wildlife office to eat and organize. One wall of the office supported a huge aerial photo of the military installation, and we often studied it and discussed landscape features while we waited until time to check the traps. Our attention was frequently drawn to the impact areas where artillery barrages and munitions explosions set fires annually. We were particularly interested in them because of their fame as hot spots for local quail hunters. The hard-core quail hunters on Fort Bragg waited in anticipation for the few days that the impact areas were closed to firing and open for hunting. They knew that on a good afternoon they might see as many coveys as they would find in a week of hard hunting on the remainder of the military installation. We studied the impact areas, easily distinguished from the remainder of Fort Bragg by their sparse tree cover.

I don't really remember when I first put it all together. The stories of fantastic quail hunting in the vast grasslands of the impact areas, hunting reports from the "good-old days," the crisp old aerial photos, the aerials of the impact areas and the new fuzzy aerial photos. Everything gradually came into focus.

The old photos from the 1950s and the photos of the artillery impact areas share many common features. Individual longleaf pines can be identified; the Sandhills drains show crisp lines where they meet the uplands; and on the larger streams one can even track

***Another aerial photograph** of the same area taken in 1988 shows how the open landscape has closed. In the absence of frequent fire, hardwood trees have grown up and shaded out the open spaces. Traditional winter fires are not hot enough to eliminate these hardwoods. As a result, the quail-nourishing grasses and herbs that flourished in the open conditions disappear, and quail and other wildlife populations decline.*

U.S. DEPARTMENT OF AGRICULTURE

1984

1989

1993

1996

PHOTOGRAPHS BY TERRY SHANKLE

***From a photo series** shot annually from the same spot from 1982 to 1996, these four photographs show graphically what happens to a Sandhills forest when fire is nearly eliminated. Two winter fires in 1986 and 1989 were not enough to eliminate the hardwoods that have choked the woodland. The early landscape produced food for quail and other wildlife, but today the forest is less suitable for the bird. A series of growing-season fires would kill the hardwoods and restore the open conditions.*

the water as it meanders across the wetlands. What was missing from the old photos and the impact areas was tree cover!

Finally, I could visualize how the Sandhills could pump out quail by the thousands. When wildfires ran rampant and pines were pillaged for timber, the Sandhills were essentially one big impact area. Hardwood trees were regularly torched by spring and summer wildfires that swept through the drains. Ground cover was lush and diverse in the open conditions created by frequent fires. Even the larger drains occasionally burned, thinning the hardwoods and allowing light to reach the ground. Through the 1960s, we didn't possess the means to control or stop wildfires in the Sandhills effectively.

During the 1960s and 1970s, managers systematically began using cool winter fires to fireproof the uplands. This prevented wildfires but failed to set back hardwoods. Most significantly, it left the wet winter drains unburned, encouraging the growth of light-robbing hardwoods and discouraging the grasses and herbs that provide food and cover for bobwhites. Trees in the productive soils along the wetland transition zones grew quickly and shaded the quail food and cover plants.

The aerial photos were not out of focus after all. What they tell us is that the Sandhills are indeed changing. As hardwoods mature and pines grow, canopies close. The crisp lines that once distinguished the wetland upland transition have faded. The sunny reed beds and grassy drain edges, with a diversity of quail food and cover plants and an abundant insect population, have been lost to trees and brush. Fire-dependent ground cover plants that once provided the best quail habitat suffered, first from lack of disturbance and later shade. As a result, quail populations declined. Only in the impact areas, where fires continue to burn frequently and uncontrolled, have the conditions necessary for quail production in the Sandhills persisted.

What does the future hold? Managers on both Fort Bragg and the Sandhills Game Land are making some positive steps. Both staffs are focused on restoring the longleaf pine/wiregrass upland habitats by promoting the use of prescribed fires and by eliminating mid-story hardwoods with fire, herbicides and mechanical means. Ironically these efforts are being primarily driven not by quail, but by the group of endangered and threatened plants and animals which once also thrived in the open forest conditions when fires ran rampant. My prediction is we will see some improvement in Sandhills quail populations as smaller wetland drains are opened up with spring and summer fires, overstories are thinned and ground cover is restored.

But I'm not so sure that we'll ever return to the days when Fort Bragg and the Sandhills Game Land produced quail from boundary to boundary. To make and maintain the open, productive wetland edges that once pumped out so many quail, aggressive tree harvests will be required and hot fires will have to run through the larger drains. Yet, given the current legal climate, it is unlikely that there will be much support for the intense burning programs and aggressive timber harvests needed to restore pristine quail habitat in the Sandhills. For one thing, these kinds of fires carry too much liability for land management agencies to assume. And the kinds of timber harvests that promote quail habitat may raise the hackles of many hunters, environmentalists and neighboring landowners.

There are other reasons for pessimism. Management decisions on public lands today involve a series of compromises among often conflicting demands by different interests. Forest managers must consider not only such traditional considerations as the desire for commercially valuable forest products, but also nontraditional factors such as endangered species protection, support from hunters, public sentiment, manpower needs, budgets and politics. Unfortunately for the quail hunter, then, the constraints under which today's land managers work will not allow them to produce the high-quality quail habitat that was a by-product of haphazard management (or even downright exploitation) in the past.

Even on large public holdings in the Sandhills that are managed for wildlife, the needs of bobwhite quail will be only one of many considerations that will play a role in shaping the landscape of the future.

Terry Sharpe is the Small Game Project Leader for the N.C. Wildlife Resources Commission.

THE Swamp THAT *Burns*

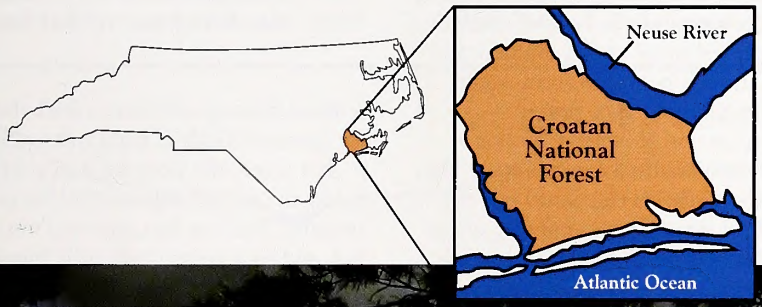
Though water nourishes the vast pocosin wetlands of our outer coast, fire plays a critical role in maintaining and restoring them.

written by Lawrence S. Earley

A friend once compared a walk through a pocosin to a hike lengthwise through a privet hedge.

I thought of that a couple of years ago when a story surfaced in a state newspaper about a fellow who got lost in a pocosin. After wandering futilely for a couple of days, he finally emerged, hungry and bewildered, his clothes in shreds. The story didn't say, but I imagine he also had a healthy new respect for one of the wildest and most hostile environments in eastern North America.

If you've never experienced a North Carolina pocosin (the correct pronunciation is PUH-KO-SIN), don't scoff at a story like this. Getting yourself confused in a pocosin is pretty easy, and getting your clothes torn to shreds in the process is easier still, as 19th century surveyer Ebenezer Emmons discovered. "The immediate border [of the pocosin] is so thickly overgrown with briers, reeds, bamboos and other ugly bushes, that it is at the expense of a man's coat, pantaloons and shirt, if he forces his way through them," he wrote.



***A pocosin fire in the** Croatan National Forest burns intensely. Though frightening to humans, such fires are nature's way of renewing the forest. Only in a fire does the pond pine tree release its seed to be nourished by the nutrients in the ash.*

ROGER HUNGERFORD

And if you're listing what makes a pocosin a formidable experience, don't forget summer heat, the occasional Eastern diamondback rattlesnake coiled just out of sight, the unseen torments of chiggers and ticks, and the mucky, acidic soil that can rot the cotton fibers out of your boots. Add this up and you've got a recipe for an outdoors' nightmare. Or, depending on how you look at it, a unique wilderness experience unmatched anywhere in eastern North Carolina.

Which is the tack that Lauren Hillman is taking one spring day as we drive slowly past a solid, impenetrable wall of evergreen pocosin shrubs. The district ranger at the Croatan National Forest since 1992, Hillman previously worked in Asheville, in the cool and picturesque shadows of the Nantahala National Forest. Despite the change, she's enthusiastic about the challenges of managing the 160,000-acre Croatan forest and its punishing pocosins.

"Actually the Croatan is unique in the national forest system from many standpoints," she explains. "We are a truly coastal forest, not a Coastal Plain forest. If you look at the map, you can almost circumnavigate the Croatan on large estuarine rivers. And we have one of the largest remaining intact pocosins in the world. I think it's the most fascinating ecosystem ever. You're in the southern United States. You have this huge swamp. And it burns!"

Indeed, it burns spectacularly and dangerously, especially if it hasn't burned in a while. Which is why fire in the Croatan is one of Hillman's chief concerns these days.

***The thick pocosin** vegetation nearly hides the figures of two researchers. The impenetrable forests and their mucky soil discouraged early settlement.*

ROGER HUNGERFORD

WILLIAM S. LEA

***Several kinds of** plant communities flourish in a pocosin, depending on the depth of the peat, the soil moisture and the frequency of fire. The stunted vegetation above grows over thick layers of peat.*

Pocosins represent a curious paradox. They are a major wetland type in eastern North Carolina, taking possession of an ancient land where seas once surged and then withdrew, and where a spider's web of now extinct freshwater creeks drained the flat land. Though begotten from water, pocosins are maintained by fire.

Pocosins are one of North Carolina's least understood natural communities. They occur nowhere else in the world but the southeastern United States, and they are at their greatest extent in North and South Carolina. Pristine examples are found not only in the Croatan but on other public lands such as the 50,000-acre Holly Shelter Game Land, owned by the N.C. Wildlife Resources Commission, Jones Lake State Park, Bushy Lake State Natural Area and Alligator River National Wildlife Refuge. At one time, pocosins laid claim to a giant swath of the eastern Carolinas—more than 2 million acres—of which perhaps 70 percent lay in the Tar Heel State. They originated about 10,000 to 15,000 years ago when, for uncertain reasons—beaver dams? huricanes?—some of the rivers and streams that drained the flat Coastal Plain were blocked. As a result of this ponding action, undecomposed layers of leaves, branches, tree trunks and other organic material began to accumulate into thick layers of peat, filling and concealing the former stream valley and rising in a dome over the former stream channel. *Pocosin*, the Native Americans called these areas. "Swamp on a hill."

For centuries settlers by-passed these boggy places with the shifting, spongy soil. "At every lick of the axe or tread of the foot the bog quivered," wrote one surveyor in 1874." But in the 1960s and '70s hundreds of thousands of acres of pocosins were bought by corporate "Super Farms" that dug miles of drainage ditches to work the land for immense fields of corn and soybeans.

For some, the deep beds of peat just below the surface represented the greater treasure. Peat can be converted into methanol, and for a country recently humiliated by the Arab oil embargo of 1973, peat methanol seemed a bright path to an energy future independent of foreign oil. The figures were startling. North Carolina's peatlands covered an estimated 1,000 square miles. Something like 600 million tons of peat (dry weight) lay beneath the briery wilderness of eastern North Carolina.

Mining the peat was another story, however. There were technical problems. When the behemoth peat-cutting machines weren't turning up stumps and ancient tree trunks, they were getting bogged down in the mire. Biologists worried about the effects that drainage ditches were having on the productivity of the sounds. (See "Hot Issue Down East," *Wildlife in North Carolina*, August 1981.) Conservation groups sued. In a relatively short time many of the farms went bankrupt. But the damage was done. Today only about a third of the original 2.2 million acres of pocosins remain in their natural state, and a substantial fraction of them are in the Croatan.

Not all pocosins are the same. They look very different depending on several conditions —the length of time the soil is wet (or hydroperiod); the thickness of the peat; and the frequency and intensity of fire. As these conditions change, the plant community changes with them. The deeper the peat and the

Sweet bay magnolia tree

LAWRENCE S. EARLEY

Wild iris

MELISSA McGAW

Butterwort and sundew on moss

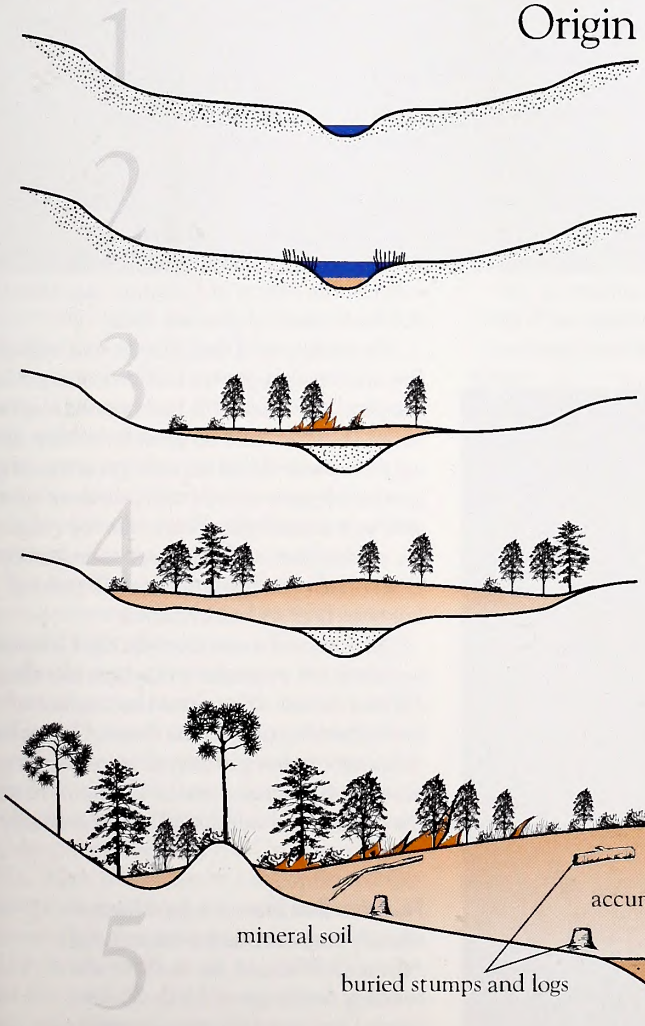
WILLIAM S. LEA

wetter the soil, the more nutrient-poor the community and the more stunted the plants.

If you're standing at the edge of Croatan's Catfish Lake, for example, you're in a relatively diverse forest of pond pines, loblolly pines and some red maple. The number and diversity of trees show that the peat is only a thin veneer over deeper mineral soil. This *pond pine forest* is a very different community than what you'd find not too far away where the shrubs are barely knee-high and the loblollies have been replaced by a mere scattering of gnarled and dwarfed pond pines. The peat is so deep here—perhaps 8 feet deep—that the roots can't reach the nutrients in the mineral soil far below. You're standing on a peat dome made up of centuries of accumulations of leaves, plant bodies, branches and other organic materials over the original creek channel. This stunted community is known as *low pocosin*.

In between these extremes are two other distinct communities—*high pocosin* and *pond pine woodland*. All are distinguished by peat depth, moisture and fire frequency. Peat accumulates at the rate of about a foot every thousand years. Stick a shovel into the ground and the peat would look black and fibrous, with small pieces of wood, leaf and root remains and even charcoal mixed in from

Origin of a Pocosin



1. A pocosin in the Croatan National Forest began perhaps 12,000 years ago as a small stream that cut through the flat and sandy coastal soils.

2. After the stream was blocked by downed trees, the water ponded behind the dam. Silt carried by the creek formed good growing conditions for freshwater marsh vegetation. Peat began to accumulate as aquatic plants died.

3. Sitting atop the old creek channel, the pond gradually filled with peat. Trees such as baldcypress began to invade the wetland and peat fires broke out for the first time.

4. Peat continued to accumulate, creating a spreading peat dome over the old creek channel. Atlantic white cedar trees replaced bald cypress trees as standing water appeared only seasonally.

5. Peat deepened and spread across the creek valley. On the deepest peat, the plants are short and stunted because the roots cannot reach mineral soil. Approaching the edge of the peat dome, plants grow taller, fuller and straighter. Today's Croatan pocosins consist of extremes of low and high pocosin.

GRAPHIC BY LEE RATCLIFFE

Source: Lee Otte et al., "Controls Over Peat Deposition on the North Carolina Coastal Plain," in *Geological Excursions in Virginia and North Carolina* (Dept. of Geological Sciences, Old Dominion University, 1987).

fires that burned centuries ago. The bottom 2 to 4 feet of Croatan peat come from the remains of ancient Atlantic white cedar forests. And while the top layer of these organic remains looks substantial, the peat is so wet that only about 10 percent of it is organic and mineral matter. Even in the summer, when the water table falls 3 feet or so, the peat may still be about 70 percent water.

Yet it will still burn. In fact, fire is an essential process that maintains the pocosin, recycling the nutrients trapped in the living and dead vegetation and making them available for the plants to absorb. Many of the plants are adapted to fire and have evolved to burn.

"What a lot of folks don't realize is that the nature of the vegetation in pocosins is similar to the chapparal in California," says Hillman. "It actually has heavier fuel loads than chapparal. It's a shrub ecosystem with highly volatile compounds in the vegetation. It's explosive. And the ground burns, too, not just the plants! You can put fire breaks through chapparal, but in pocosins the fire can burn under the lines."

Cecil Frost, the state's plant protection specialist, has studied the pre-settlement vegetation patterns of the Croatan and has found that 95 percent of the national forest consists of fire-maintained plant communities. Before settlement, he says, the entire Croatan and Carteret peninsula comprised a 300-square mile fire zone with no natural fire breaks. Just about everything burned.

The Croatan is made to burn!

KEN TAYLOR

***Suburban developments** around the Croatan like this one near New Bern result in calls for fire suppression. Where wildlands meet urbanizing areas, natural processes like fire take a back seat.*

Yet until recently, foresters deeply distrusted fires and put them out as soon as they could. In the 1940s, the U.S. Forest Service conceived one of the most brilliant public relations campaigns of all time. "Only You Can Prevent Forest Fires!" said Smokey Bear with an authority that convinced millions of people that forest fires were unmitigated evils. The Forest Service won the battle, but in so doing it lost the war, at least in the Southeast. Fire suppression contributed greatly to the demise of dominant forest types such as the longleaf pine, which once covered more than 90 million acres in the South. And in many communities such as pocosins, the lack of fire allowed fuel to build up to dangerous levels, creating conditions ripe for an inferno.

Which is what happened in May 1994 when more than 24,000 acres of Croatan National Forest pocosin burned in what has become known as the "Fish Day Fire." James Cherry, fire officer at Croatan, says that the fire was typical of pocosin fires.

"It started on a Saturday from a vehicle fire and we thought we had it contained by Sunday," he recalls. "It had burned maybe about 90 acres. But on Monday it blew up again because it had actually gone into the ground. It gave us a fit with three or four different wind shifts. There was fire behavior in that fire we had never seen before." Cherry says fire fighters were still putting out spot fires six months later.

To reduce the fuel levels in the Croatan and forestall incendiary disasters like this, Hillman wants to increase the amount of prescribed burning in the forest. Only a few years ago, forest personnel were burning about 8,400 acres a year at Croatan. Now they're up to about 20,000 acres annually

KEN TAYLOR

***Pocosins that have** not been burned recently pose extreme fire hazards (left). After a 45,000-acre fire in 1986, the smoking landscape of Holly Shelter Game Land near Wilmington testifies to the power of a pocosin fire (next page).*

KEN TAYLOR

and aiming higher. Indeed, Croatan's 1997 management plan depends largely on the use of prescribed fire across the forest. Ecosystem management—the current paradigm guiding forest management in the national forests—attempts to mimic the natural processes regulating the native ecosystems. In the case of southeastern ecosystems, of course, this means reintroducing fire in a big way.

But how do you control prescribed burning in pocosins where fire has been suppressed for decades or more? The fuel levels are often so high that managers are afraid that any fire may burn quickly out of control.

Roger Hungerford has been trying to help answer these safety questions. A research forester with the U.S. Forest Service Fire Lab in Missoula, Mont., Hungerford has been studying the pocosin fuels in the Croatan since 1992. What he has found has confirmed the conventional wisdom about the volatility of pocosin fires. For example, in tests in his lab, and in field observations, he showed that a peat fire gives off so much heat that it can burn soils that are fairly saturated with water!

Such volatility has traditionally made many fire managers understandably nervous about burning pocosins. For example, Cherry, the Croatan's fire manager, says they start burning pocosins only in January, after a rainfall. "We'd like to get it so that the fuel on top burns but not the organic material underneath," he explains. "We've got a very narrow window in which these conditions exist. Between Oct. 1 and the end of February, perhaps only 22 days are right for burning, and maybe only four or five of them are right for burning pocosins."

But Hungerford is finding that the windows for pocosin burns may be wider than managers have thought. "We took about 70 fuel plots in Dare County, Croatan and the Green Swamp," he says. "We have a pretty good idea of how the fuel is different in each place and we can begin to tie that into how we can do some prescribed burning." Successful experimental prescribed burns in the Croatan and Brunswick County's Green Swamp in June 1996 and September 1997, respectively, showed that managers can learn to control prescribed pocosin fires even during the growing season.

MELISSA McGAW

"The Croatan is either going to burn catastrophically on its own, or it's going to burn under controlled circumstances."

—Lauren Hillman - Croatan National Forest

WILLIAM S. LEA

New life emerges *quickly after fires. This whitetail no doubt is looking for tender browse that grows within days in the flush of nutrients produced by a prescribed fire.*

In some places, of course, this may be impossible. Hungerford says that some places in the Croatan have dangerously high fuel loads. "You've got plant litter 2 to 3 feet high on top of the original ground surface," he says. "It's a powder keg. If fire got in there it would just explode." Croatan's fire managers are trying to figure out ways to reduce these dangerous fuel levels before they burn.

In other places, residential developments snuggling up to the Croatan make it more difficult to use prescribed fire. Near the small community of Croatan, I saw a graphic example of why that's the case. The backyards of one new development crept within 50 feet of the forest wall. Did the owners of these little houses understand that their neighborhood was in a fire zone? Would they support forest managers when they set periodic prescribed fires to reduce the fuel and enhance the forest ecosystem?

In many places in the Southeast, not only North Carolina, the answer is "no." The threat of lawsuits over damages from prescribed fires is inhibiting many forest managers from carrying out the burns needed for proper forest management. (see "The Fire Next Time," p.19) The public's fear of fire, however, carries a stiff price, Hillman says. "Of the 160,000 acres on the Croatan, all of them will burn and more than 90 percent require fire to maintain their natural state," she says. "The Croatan is either going to burn catastrophically on its own, or it's going to burn under controlled circumstances."

One spring day, as I walked down the forest road near Catfish Lake in the Croatan National Forest, the pocosin landscape was alive in various shades of green and dozens of hues of flowering plants. The little white bells of honeycup (*Zenobia pulverulenta*) were in bloom, as were sweet bay (*Magnolia virginiana*). The yellow pitcher plants were flowering, and the heavy heads of the purple pitcher plants leaned like burgundy lamp shades. A mist hung over the expanse of low pocosin near the lake, and lowering clouds held stationary all morning, though no rain fell.

At one point I knelt to examine a deer track in the black ooze that was slowly filling with water. I looked around but saw only space.

Water engendered pocosins; fire nourishes and maintains them. We may not want to drain them any longer, but we may kill pocosins just as effectively by depriving them of the restorative flames. Unless we can accept the place of this elemental process, our own fear of fire may well pose the most serious long-term threat to these difficult, hostile and wholly unique wetlands.

The FIRE NEXT TIME

There's a consensus today that southern habitats need more fire, not less. Do we have the will to make that happen?

written by Lawrence S. Earley

Not long ago, Ken Perry, Chatham County's forest ranger, was helping a landowner plan a prescribed burn for his woodland. Following North Carolina's voluntary smoke management guidelines, he and the landowner notified the adjoining landowners of the date and time of the fire. But when a neighbor whose wife had lung problems objected to the burn, things got out of hand. A local newspaper got onto the story and before long the county manager was involved.

"We went to the landowner and the agent that was handling the tract," said Perry, "and we pretty much decided that instead of stirring up a big stink over the whole thing, we'd cancel the burn. The tract was really marginal anyway."

Depending on how you look at it, this is either a reasonable compromise over a potential health risk, or a decision with serious ecological consequences. Or both.

Any way you look at it, it's a conflict that's increasingly common. Back when cows outnumbered people in the forests, smoke and fire were familiar seasonal phenomena that were understood and tolerated. But today, fire and smoke are threatening to many people, especially to recent transplants from urban areas, north and south, who have only experienced the negative sides of fire. New residential developments in what is called the "wildland/urban interface" are making it difficult to apply traditional management strategies.

"The coastal area around here is developing so fast that there is a greater demand for paved roads through the Croatan [National Forest]," district ranger Lauren Hillman explains. "Paved roads eliminate or disrupt wildlife habitat and they complicate smoke management enormously. When we burn now, we need support from the state Highway Patrol, the sheriff's department and the municipalities. As the number of roads grows, the risk of injury or fatality because of a smoke-related accident increases."

Similar pressures to pave and upgrade roads are occurring on the Wildlife Commission's Sandhills Game Land. Bill Parson, the wildlife forester who manages the extensive burning program on the game land, finds it more difficult to plan and conduct burns when he has to prevent smoke from covering more heavily traveled paved secondary roads. The state Department of Transportation currently plans to pave additional secondary roads that cross the game land.

pre•scribed burn•ing (prı-skrıbd´ bûr´nıng) *n.* the controlled application of fire to wildland fuels in either their natural or modified state under favorable conditions of weather, fuel moisture, or soil moisture that allows the fire to be confined to a predetermined area.

—*Society of American Foresters*

The result, as Ken Perry and many other forest managers have found, is increasing pressure to burn less.

Prescribed burning is not something that land managers take lightly. Before they can burn, managers must draw up what can be a highly complex plan that covers the desired objectives of the fire, the weather needed, the firing method to be used, and control and mop-up contingencies.

"This is not something we do without concern for what's around," says Perry. "There are some parts of the county I won't even burn now. The northeastern part [of Chatham County] is so heavily populated that it's just hard to burn."

To address the threat of liability associated with prescribed fire, the state Division of Forest Resources, the N.C. Forestry Association and The Nature Conservancy last spring helped draft Senate Bill 859 and House Bill 1120, both titled "Prescribed Burning in Forests." The bills would have relieved prescribed burners of liability provided they follow certain guidelines. According to these guidelines, a plan or "prescription" for the burning would be prepared by a certified prescribed burner and filed with the Division of Forest Resources.

The bills described the critical nature of fire for many of North Carolina's natural ecosystems. "Prescribed burning is essential to the perpetuation, restoration, and management of many plant and animal communities," they stated. "Fire benefits game, nongame, and endangered wildlife species by increasing the growth and yield of plants that provide forage, escape, brooding, and other habitat needs."

The bills were modeled after laws currently in force in other southern states, notably the Florida Prescribed Burning Act of 1990. This law recognizes the importance of prescribed burning in promoting the safety of the public, the environment and the economy of Florida. "No property owner or his agent, conducting a prescribed burn pursuant to the requirements of this subsection, shall be liable for damage or injury caused by fire or resulting smoke, unless negligence is proven," the law states. So compelling is the need for prescribed fire in Florida that in 1997 the governor and cabinet recognized the second week of March as "Prescribed Fire Awareness Week."

Disappointing to their supporters, North Carolina's two bills were referred to committee in both the House and the Senate before they could come to a vote. The bills will be reintroduced during the General Assembly's short session this spring.

Will controlled fire in southern ecosystems be banned in the 21st century as the chances of liability increase? It's a question that many are asking seriously for the first time.

We Are NOT BURNING ENOUGH!

An interview with Dale Wade

"In my view, even as we proclaim the merits of prescribed fire, we have failed as federal land managers to make a strong, urgent case to all stakeholders, showing them where fire can make the land more productive and, therefore, why they should support using the restorative flames."

—*Interior Secretary Bruce Babbitt*
May 9, 1996

Dale Wade is a forest researcher with the Southern Forest Fire laboratory, U.S. Forest Service, stationed in Athens, Ga.

Wildlife in North Carolina—Are we burning enough in the Southeast?

Dale Wade—We're actually burning more today than we were 20 years ago, but from an ecosystem health standpoint, we are not burning enough. Our rough guess is that we probably ought to be burning four to five times the acreage that is currently being burned.

WINC—If we're burning more than we were 20 years ago but it's still not enough, what's going to happen if we don't increase the number of acres we're burning?

DW—The vast majority of the threatened and endangered species in the South are in fire-adapted ecosystems. Without fire, those species that thrive on periodic fire will eventually be extirpated from the area. The increasing fire hazard because of a lack of fire is a problem. And the ecosystems themselves would change without fire. For example, in fire-suppressed longleaf pine forests hardwoods take over the site and you end up with a hardwood ecosystem. You'd still have a forest out there, but it would be vastly different from what was here when the Europeans showed up.

"Paradoxically, rather than eliminating fire, exclusion efforts, combined with other land-use practices, have in many places dramatically altered fire regimes (circumstances of fires, including frequency, intensity, and spatial extent) so that today's fires tend to be larger and more severe. No longer a matter of slow accumulation of fuels, today's conditions confront us with the likelihood of more rapid, extensive ecological changes beyond any we have experienced in the past. To address these changes and the challenge they present, we must first understand and accept the role of wildland fire and adopt land management practices that integrate fire as an essential ecosystem process."

—*Federal Wildland Fire Management Policy and Program Review, 1995*

WINC—What can be done about the lack of prescribed burning in the South?

DW—The ultimate decision is going to rest with the public. The assistant state forester in Florida said, "They're shipping 'em to us faster than we can educate 'em." We have a large and ever growing segment of the population that is retiring from the north or moving into the country from the southern cities and they've lost touch with the ancestral use of fire. They see fire as inherently bad. We have a problem with smoke in the "urban/wildland interface." And that's a double-edged sword because if you don't burn, the fuels are going to build up and sooner or later it'll burn. A fire on the wrong day can really wreak havoc.

And we need more education. I'd like to believe that people just don't understand the benefits of fire. Their whole idea of fire is bad. If you look at a recently burned area, it doesn't look very nice. You have to wait a few weeks before the ground begins to green out again. But people don't know they have to do this. They form a first opinion and it's very negative.

Florida's law is the best we have, but it has not been challenged in court yet and it's hard to know what will happen when it is. If the validity of the law is upheld, fine, but if a judge or jury rules against the law, which they could very well do, it certainly would not bode well the next time somebody would want to sue.

WINC—Can forests still be productive without prescribed fire?

DW—You could use chemical herbicides to keep the brush down instead of fire. That's what the timber industry is doing. Not that they think it's safer environmentally, but with chemicals they don't get sued for off-site impacts. Instead of using fire to prepare seed beds, they can go in after logging and use mechanical methods to prepare a site and plant trees. Without fire, we can still have a viable forest industry in the South. Of course, it will cost more.

WINC—But if you restrict yourself to chemicals, you're missing the important benefits of fire. For example, fire stimulates the growth of seed-carrying plants which are essential for healthy populations of bobwhite quail.

DW—You're not going to do that by using chemicals. It's a poor substitute.

FIRE & HEALTH: A DILEMMA

Where there's fire, there's smoke.

In July 1997, the Environmental Protection Agency strengthened its national ambient air quality standards for particulate matter and ozone. Though written to protect human health, the new standards pose a threat to the continued use of prescribed burning.

Fossil-fuel-burning trucks, cars and industries contribute the most to high ozone levels but fire may play a part—scientists are still arguing over how big a part—by emitting nitrogen oxide which reacts with other chemicals in the atmosphere to form ozone. Ozone is nothing to take lightly—according to one estimate, 60,000 people die prematurely each year from respiratory diseases caused by breathing polluted air.

In some states, fires have been banned especially during the growing season when ozone levels rise. "In the 10 counties around Atlanta, Georgia has banned burning from April through October," says Bill Jackson of the U.S. Forest Service in Asheville. Jackson says that in North Carolina, possibly 17 counties could violate the new standards. The EPA's new standards could restrict fire in those counties.

If so, it might mean pitting the mandates of one federal law against those of another —the Clean Air Act, for example, versus the Endangered Species Act. For an endangered species such as the red-cockaded woodpecker, the loss of fire would be catastrophic. The bird needs a clear understory to forage for its food and burning is the best and the cheapest tool to accomplish this end. But protecting the woodpecker by burning might put one in violation of the Clean Air Act.

"THE WILDLAND/URBAN INTERFACE IN THE SOUTH IS ONE OF FIRE & SMOKE."
—Gary Achtemeyer, U.S. Forest Service

In a letter to EPA administrator Carol M. Browner in December 1996, the Southeastern Association of Fish and Wildlife Agencies expressed concern about the environmental effects of the proposed air-quality standards. The group pointed out that increasing prescribed burning would actually decrease pollutants by reducing the amount of biomass being burned.

"The forestry community in the South is between a rock and a hard place," says Gary Achtemeyer, research meteorologist with the U.S. Forest Service. "If you burn, you have the air quality problem; if not, dangerous fuels build up and then you have wildfire and you've got really serious problems."

"FOR MANY PEOPLE, FIRE REMAINS A FEARSOME, DESTRUCTIVE FORCE THAT CAN AND SHOULD BE CONTROLLED AT ALL COSTS. SMOKEY BEAR'S SIMPLE, TIME-HONORED 'ONLY YOU' FIRE PREVENTION MESSAGE HAS BEEN SO SUCCESSFUL THAT ANY COMPLEX TALK ABOUT THE HEALTHY, NATURAL ROLE OF FIRE AND THE SCIENTIFIC CONCEPTS THAT SUPPORT IT IS OFTEN LOST . . . ."

—Federal Wildland Fire Management Policy and Program Review, 1996

FIVE BENEFITS of FIRE

1) **Fuel Reduction.** Fire reduces the amount of flammable debris on the forest floor and also reduces the threat of life- or property-threatening wildfires. This ensures that your timber stand is not damaged or destroyed by fire.
2) **Nutrient recycling.** In many ecosystems where fire is withheld, nutrients are trapped in plants that take a long time to decay. Fire breaks down the organic materials and makes the nutrients available for uptake by growing plants.
3) **Plant reproduction.** Fire creates the conditions necessary for the reproduction of many plants. It releases seeds in some plants and trees, creates openings, clears the soil for the seed to germinate, and floods the site with nutrients for the new plant.
4) **Wildlife habitat maintenance.** Fire creates the conditions for producing legumes and other seed-bearing plants, which are necessary foods for quail, turkey and many other game and nongame species. In addition, sprouts and annual weeds and grasses respond to fires with a flush of new growth. The actively growing plants provide more nutritious browse for rabbits and deer.
5) **Native ecosystem restoration.** Fire can help control insects and diseases that affect forests. Fire also kills hardwoods that have encroached into pine forests where fire has been suppressed for decades. For example, prescribed burning in longleaf pine forests swallowed up by scrub oaks after decades of fire suppression can reduce the oaks, open up the forest and restore wildlife populations.

"IF YOU BURN TO REDUCE FIRE HAZARDS, YOU CAN HAVE SOME SMOKE NOW UNDER CONTROLLED CONDITIONS AS OPPOSED TO SMOKE AND FIRE UNDER UNCONTROLLED CONDITIONS. IT'S ONE OF THOSE 'PAY ME NOW OR PAY ME LATER' SITUATIONS . . . . WHAT WE NEED IS A BETTER UNDERSTANDING OF AND OPENMINDEDNESS TOWARD FIRE, ESPECIALLY FROM ANYONE WHO . . . IS LIVING IN CLOSE PROXIMITY TO THE WOODS."

—Derryl Walden, N.C. Forest Resources

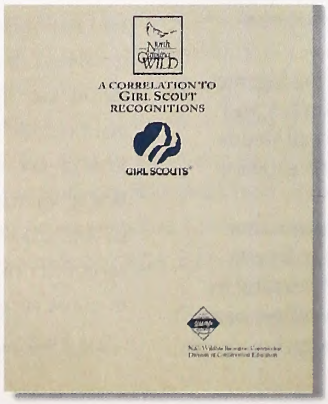
Girl Scouts Go WILD

KEN TAYLOR

When Girl Scout leaders use N.C. WILD and N.C. CATCH activities to enrich their programs, the results are worth the effort.

written by Celeste Wescott

On a cloudy Saturday morning in November, Stanback Middle School in Orange County rang with the excited voices of Brownie and Junior Girl Scouts from a variety of troops who were participating in more than 20 N.C. WILD activities. Some scouts played the roles of hawks, shrews and grasshoppers in the activity, "Deadly Links,"



which helps to graphically teach how plants and animals in food chains are affected by harmful substances. Outside, other Girl Scouts conducted an environmental field study by taking soil samples, listing plants and animals observed and discussing the uses of the area, both past and current. N.C. WILD is based on the highly successful and popular, international Project WILD programs.

N.C. WILD, the N.C. Wildlife Resources Commission's wildlife and conservation education program, is turning up in more and more places these days. At Stanback Middle School, N.C. WILD Day was organized by Rachel Patterson, a master trainer for the Pines of Carolina Girl Scout Council. She promotes the use of N.C. WILD activities to meet the requirements for specific Girl Scout recognitions such as the Brownie Girl Scout

Try-It or a Junior Girl Scout Badge. When the day is over, each girl scout reflects on a day filled with fun and goes home with one of these recognitions.

Of course, Patterson isn't the only one enthusiastic about the use of N.C. WILD in Girl Scouting. "I have used N.C. WILD materials for over 10 years to enhance and stimulate Girl Scouts' appreciation and enjoyment of outdoor education," says Rachelle Deats, fifth grade teacher and former director of adult development with the Pines of Carolina Girl Scout Council. "The wide range of topics and subject matter makes the activities very easy to incorporate into most any project." She especially appreciates the detailed instructions and the background information that come with the activities, and she believes they are appropriate for the scouts' age and employ a wide variety of skills for both indoor and outdoor use. "I am a firm believer that learning should be fun," she says. "N.C. WILD activities provide a means to achieving that goal."

Across the state, other adult Girl Scout council members, troop leaders and volunteers are being trained in N.C. WILD and also N.C. CATCH workshops. N.C. CATCH is similar to N.C. WILD in that it includes many fun conservation activities, but it also covers water safety and fishing skills. Both workshops are offered statewide by education specialists with the Wildlife Commission's Division of Conservation Education. The hands-on materials are fun and rewarding. Some Girl Scouts have used natural resource themes and projects to achieve the highest Girl Scout awards, like the Gold Award earned by a Harnett County Girl Scout who used the N.C. CATCH program to provide peer teaching on family communications, conflict management, water safety and recreational fishing skills.

At the council level, N.C. WILD and N.C. CATCH workshops can be used to train Girl Scout leaders in leadership development. Leaders of the Pines of Carolina Girl Scout Council earn N.C. WILD Trained Leader patches and green leaves for their leadership development pin for attending a N.C. WILD workshop.

The Pines of Carolina Girl Scout Council staff, regional trainers, troop leaders and volunteers and the Wildlife Commission's Division of Conservation Education staff recently collaborated on a publication titled *N.C. WILD Correlation to Girl Scout Recognitions* (published by the Wildlife Commission and available through The N.C. WILD Store, p. 37 of *Wildlife in North Carolina* magazine). This publication correlates N.C. WILD activities to all levels of Girl Scout recognition, from Daisy Girl Scouts to Cadette and Senior Girl Scouts. Katrina McDougald, eastern Piedmont regional education specialist with the Wildlife Commission, says that this collaboration "was a natural sequence because conservation education permeates many of the interest areas in girl scouting." The correlation is currently used across North Carolina and in other states as well.

The Pines of Carolina Girl Scout Council also chose to use N.C. WILD activities as a basis for creating unique patches of recognition for every level of girl scouting, including adult volunteers and troop leaders. Their model recognition patches can be adapted by all Girl Scout councils.

What a difference the N.C. WILD and N.C. CATCH programs can make for North Carolina's Girl Scouts! Through events such as N.C. WILD Days, troop meetings and the completion of Girl Scout recognitions and awards, N.C. WILD and N.C. CATCH help develop each Girl Scouts' self-potential, relationships with others, values and contributions to society as they follow the "Girl Scout Law." This law includes the statement: "I will do my best to use resources wisely and to protect and improve the world around me." ⊠

For more information about N.C. WILD and N.C. CATCH, contact: N.C. Wildlife Resources Commission, Division of Conservation Education, 512 N. Salisbury St., Raleigh, N.C. 27604-1188, phone (919) 733-7123; or visit us on the Internet at: http://www.state.nc.us/Wildlife/ConservationEd/

***Girl Scouts (left) take** soil samples and identify plants as part of an environmental field study, one of many N.C. WILD activities. Girl Scout leaders attending a N.C. WILD workshop (below) join in another activity called "Deadly Links" to learn about harmful effects on food chains.*

KEN TAYLOR

Go WILD and CATCH Some Fun!

Below is a brief listing of suggestions for using the hands-on, learning experiences provided to Girl Scouts through N.C. WILD and N.C. CATCH activities and materials:

- provide N.C. WILD and N.C. CATCH workshops for adult leaders and volunteers during Girl Scout council training events
- meet a cross section of Girl Scouts from urban and rural counties through day camps with common natural resource themes
- conduct multi-troop Girl Scout events such as N.C. WILD Day to encourage interconnected environmental education events
- use N.C. WILD and N.C. CATCH programs as part of a Junior Girl Scout Camporee that is facilitated by Cadette and Senior Girl Scouts
- share N.C. WILD and N.C. CATCH program concepts with Girl Scouts seeking service projects
- develop "Our Own Council's Recognition" for each level of Girl Scouting with a unique patch and age-appropriate N.C. WILD or N.C. CATCH activities.

Mapping the FUTURE *for* SONGBIRDS

With many songbird populations in steep decline, North Carolina biologists are teaming up with bird enthusiasts nationwide to gather data about these feathered wonders.

written by Rodney Foushee / photographed by Melissa McGaw

With the precision and care of a surgeon, N. C. Wildlife Resources Commission stewardship biologist Bethany Wittkop reaches into a red plastic mesh bag and removes a bewildered flycatcher. Gingerly, she holds the bird's head between two fingers and gently blows on its white chest, parting the feathers to reveal a healing brood patch and a slight bit of fat on the naked breast. The bare patch, still crisscrossed with surface blood vessels, is a sure sign the bird was recently incubating eggs. The exposed skin keeps the eggs warm.

"This one's an adult female," Wittkop calmly announces. A wing measurement, weight and skull examination confirm the obvious. But to determine the exact flycatcher species from the half dozen or so found in North Carolina takes a little more detective work. After consulting a field guide and comparing a few markings, it's decided the half-ounce bird is an Acadian flycatcher.

A small aluminum band is then carefully squeezed around the flycatcher's tiny leg, and the greenish bird is released without ceremony into the morning air. Nearby, beneath the shade of an ancient oak, five more assorted songbirds await the same examination before they also are freed.

It's mid-summer in eastern North Carolina on a quiet upland pine/hardwood forest near New Bern.

Within earshot of the makeshift banding station, biologists David Allen and Brent Wilson tend a series of fine mist nets strung between the trees. Like aerial fishermen, the biologists catch unsuspecting songbirds as they fly through the shaded forest. The undisturbed woods, with their proximity to the Trent River and the expansive Croatan National Forest, are fertile ground for songbirds. And the catch has been particularly abundant this warm morning—the last day of the mist-netting season.

One by one, ovenbirds, tanagers, flycatchers, thrushes, vireos, warblers and cardinals are tenderly unraveled from the black nets and placed unharmed into mesh bags for transport to the oak tree for further identification and banding.

All told, 182 birds from 25 species were captured and carefully identified, measured, banded and released at the site near New Bern last year. At 13 other stations across North Carolina, dedicated biologists and volunteers from various state, federal and private organizations conduct similar songbird netting and monitoring surveys during the spring and early summer breeding season.

All of the work is a critical part of the massive Monitoring Avian Productivity and Survivorship (MAPS) Program—one of the newest efforts to help understand nongame bird species. MAPS, which was initiated by the nonprofit Institute for Bird Populations in 1989, is a cooperative effort among public agencies, private organizations and bird banders to provide long-term data on the productivity, survivorship and population sizes of many North American landbird species.

With already more than 400 monitoring stations across the continent, MAPS may provide sorely needed demographic information to help scientists pinpoint the causes of decline in many landbird species, especially those forest-dwelling migrants in eastern North America. The goal of the program is to provide biologists with hard data to help them better conserve birds, bird diversity and bird habitat in the future.

With plenty of other bird populations surveys and counts already out there including the Breeding Bird Survey, the Breeding Bird Census and the venerable Audubon Christmas Bird Count, why do biologists need yet another bird survey?

The simple answer is that a warbler is not just a warbler. Most existing long-term bird studies attempt to estimate the number of birds and the species makeup for an area by passive observation. In the Breeding Bird Survey, for example, experienced birders run 3,500 preset routes across the continent and count the birds they see and hear. This is fine for revealing changes in population trends but it fails to provide detailed demographic information to explain the changes.

Simply put, none of the other surveys attempt to age the birds and track the survival of each age group along with their overall reproductive success. This can only be accomplished by capturing, banding and recapturing the same birds over a period of time. By studying the age classes plus the number of birds that are recaptured over time, scientists may find the causes of population swings. This hands-on monitoring provides important information such as the ratio of young to adult birds and adult survivorship for a variety of small landbirds. Its goal is to assess the underlying causes of bird population trends detected by the other surveys.

"It's basically like a stock assessment for fish," explains Mark Johns, the Wildlife Commission's Partners In Flight coordinator. Partners is a cooperative program to help reverse

Wildlife forester *Brent Wilson carefully removes an immature Northern cardinal from a mist net near New Bern. By catching and banding thousands of birds across the country, biologists hope to obtain long-term data on the productivity, survivorship and population sizes of many songbird species.*

Various measurements *including wing length help biologists identify this female cardinal's (near right) age and overall health. After its vital statistics are measured and recorded, a female summer tanager is carefully banded (far right) and released.*

the downward trend in migratory bird populations across the Americas. "Until you have enough samples, it's hard to figure out exactly what your population makeup is, let alone what outside factors may be causing changes."

Fisheries biologists routinely assess the health of fish stocks by catching random numbers of fish, measuring them and taking scale samples to age the fish. For larger, hunted species like deer and ducks, wildlife biologists measure ages using the jawbone and feathers taken from harvested animals. But before MAPS, such work has never been attempted on a large scale for small birds.

Besides providing information on age ratios and survivorship, biologists hope MAPS data will better explain the behavior of many neotropical birds, those which breed in the United States but migrate to Central and South America for the winter.

"Unlike waterfowl, these small birds are much harder to find and see," Johns said. "This massive banding and netting effort might help us figure out migration routes and determine important breeding areas."

For example, many birds caught in the mist nets in early spring are migrants—just passing through. But those trapped later in the season are typically breeding near the MAPS station. "There is great potential for this information to help us develop better management plans," Johns said. "But like any natural history study, the information must span many years to be meaningful."

The Wildlife Commission administers three MAPS stations in coastal North Carolina including the New Bern site, which begins its third banding year this spring. The Institute for Bird Populations also maintains six stations on the Fort Bragg Military Reservation and another in Currituck County, while federal biologists adminster one site on the Pee Dee National Wildlife Refuge in North Carolina. And private groups maintain one MAPS station each on the Blue Ridge Parkway, on the Jordan Game Land in Durham County and at Nags Head Woods in Dare County.

All of the stations follow a strict protocol to ensure the data are kept uniform. All information collected is forwarded to the Institute for Bird Populations' headquarters in Point Reyes Station, Calif., where it is compiled into regional indexes.

The need for answers is critical. Nearly all of the long-standing bird surveys show serious population declines for many landbird species, especially those found in eastern

Nongame biologist *David Allen (below) gives a wood thrush a final inspection before releasing the bird. The wood thrush is one of several eastern forest landbird species that have seriously declined in recent years.*

***A female summer** tanager (right) waits to be weighed at the New Bern MAPS station before being banded and released. By gathering information on the tiny songbirds, scientists hope to pinpoint the underlying causes of their decline and reverse this trend in the future.*

forests including vireos, warblers, tanagers and thrushes. Scientists know environmental factors including habitat destruction, habitat fragmentation, pesticide use in Central and South America, and changing land use are all having an impact. But few studies offer models that show the importance of each factor on different bird populations.

"The other survey programs do a good job of monitoring populations trends but they don't address what forces are driving these trends," said Kenneth Burton, who heads the MAPS program for the Institute for Bird Populations. "We are trying to figure out the population dynamics of why one species is increasing and yet another is decreasing."

What began as a pilot program in 1989 has spread to 44 states and eight Canadian provinces and territories. But most of the MAPS program's growth has only been in the last few years, which makes the wait for answers longer.

"Part of the problem is that it takes a long time to see patterns," Burton explains. Individual MAPS stations must operate for at least five consecutive years before reliable estimates of variation in productivity and bird survival can be made. "We are just entering the phase when the data should begin to reveal some trends," he said.

One thing is for sure—every bird captured and banded adds to the knowledge base. Who knows, an Acadian flycatcher or wood thrush banded this spring near New Bern might ultimately help biologists reverse the downward population trend for birds in the future. ⊠

You Make a Difference!

NORTH CAROLINA NONGAME & ENDANGERED WILDLIFE FUND

Your donations to the Nongame and Endangered Species Program mean that many endangered species have a chance for survival. Please keep giving. Make your contribution through the state income tax checkoff or directly to the Nongame & Endangered Wildlife Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188

For more information about the MAPS program, contact Kenneth Burton at (415) 663-1436 or email him at: birdbanding@compuserve.com

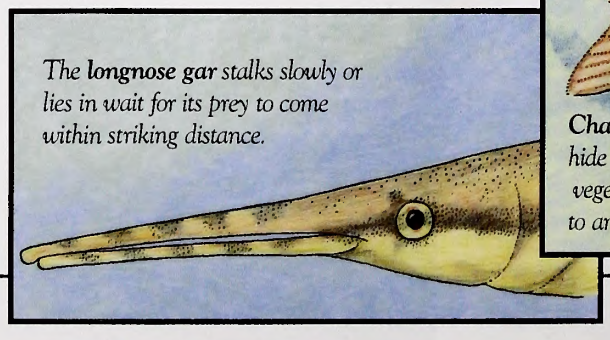
Big Fish Eat Little Fish

Take a look underwater. Aquatic habitats are a busy balance of plants and animals, predators and prey. Fish play a major role in maintaining the balance, sometimes as predators, sometimes as prey and often as both.

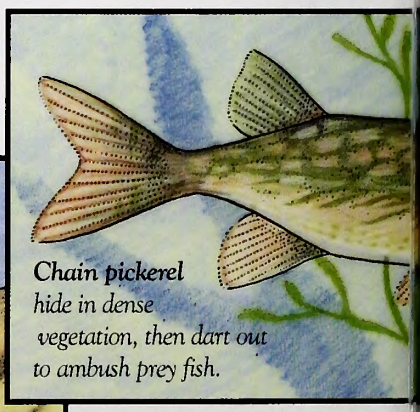
Written by Carlton Burke
Illustrated by Consie Powell

At first glance all fish may look alike but there are some noticeable differences between **predators** and **prey**. As adults, most predatory fish are large compared to the prey on which they feed. They are slender and muscular, with streamlined fins designed for speed. Their mouths are very large, which allow them to swallow prey quickly and usually in one piece. Some predatory fish like pickerel and gar have mouths studded with needle-sharp teeth perfect for grasping and holding their slippery meals. In comparison, tiny-mouthed prey fish that feed primarily on small underwater plants and insects are often small, even as adults.

Prey fish have developed numerous adaptations that help them elude hungry predators. Escape tactics include **camouflage** coloration and extreme speed and agility. Small size can be an advantage — little fish can hide in places where big fish cannot follow. Some kinds of prey fish band together in **schools**. Predatory fish cannot single out a single prey fish as easily when so many are darting about. It's too confusing. And because young fish, including predatory ones, may be eaten by adults, even of their own species, all fish produce many hundreds or thousands of eggs at a time.



*The **longnose gar** stalks slowly or lies in wait for its prey to come within striking distance.*

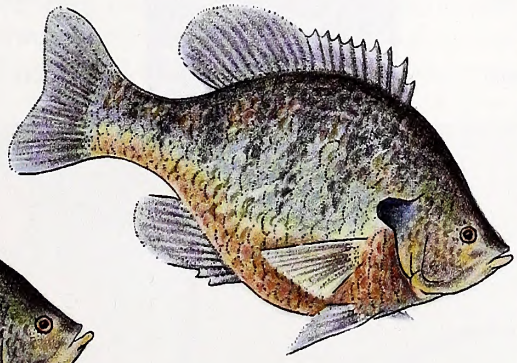


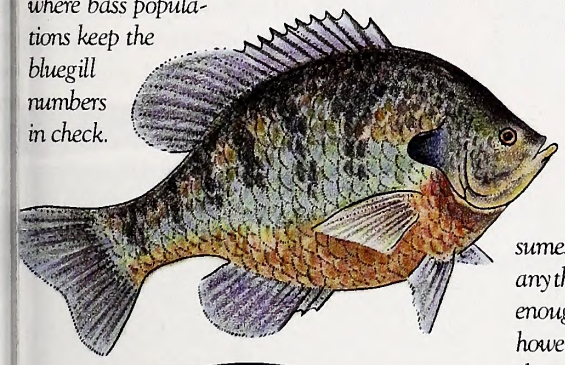
***Chain pickerel** hide in dense vegetation, then dart out to ambush prey fish.*

ARE PREDATORS HARMFUL TO THE SPECIES THEY FEED UPON?

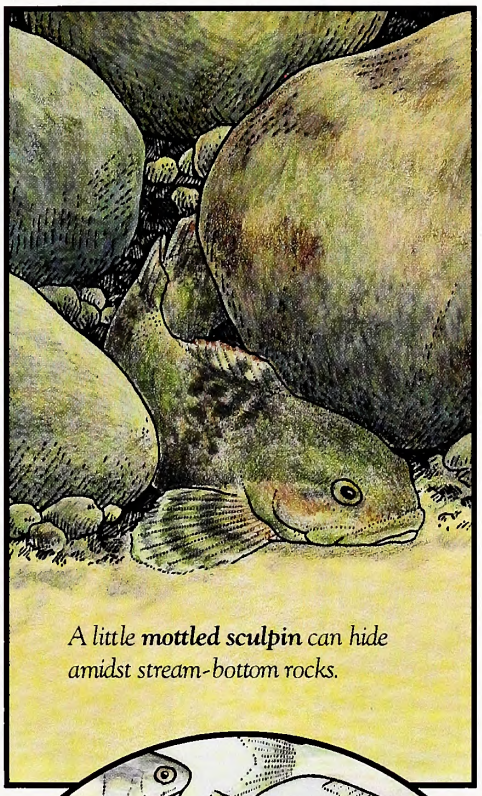
Catching prey can be difficult, so predators pursue the most easily captured prey, which are often the sick or weak. When predators remove weaker individuals from a habitat, more food and space are available to the stronger, healthier animals that remain. These surviving individuals can then pass on to their young the genetic characteristics that enabled them to escape predation and survive to breed.

*In a farm pond, **bluegills** (below) and other sunfish are commonly stocked together with largemouth bass. If too many bluegills live in the pond without enough bass to prey on them, the bluegills overpopulate their habitat and do not find enough food to eat. Large, healthy bluegills are found where bass populations keep the bluegill numbers in check.*

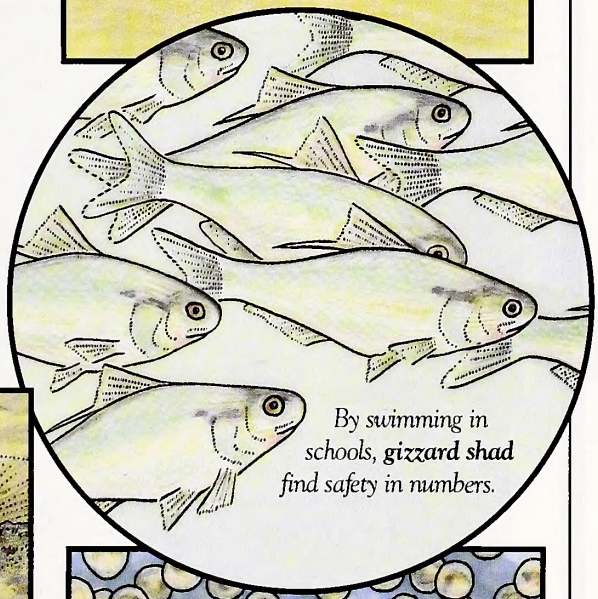




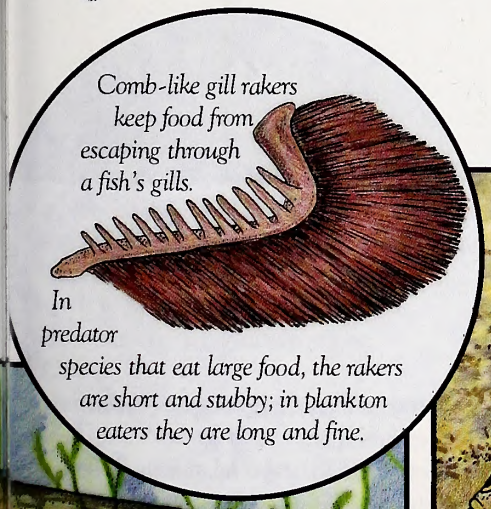
*The **largemouth bass** (far left) consumes worms, crayfish, frogs, and almost anything else that moves and is small enough to be swallowed. Its favorite prey, however, is smaller fish. Fishermen know this and when fishing for bass they often use artificial baits that resemble **minnows** and other small fish.*



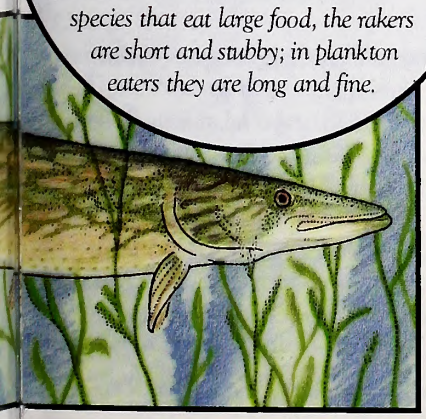
*A little **mottled sculpin** can hide amidst stream-bottom rocks.*

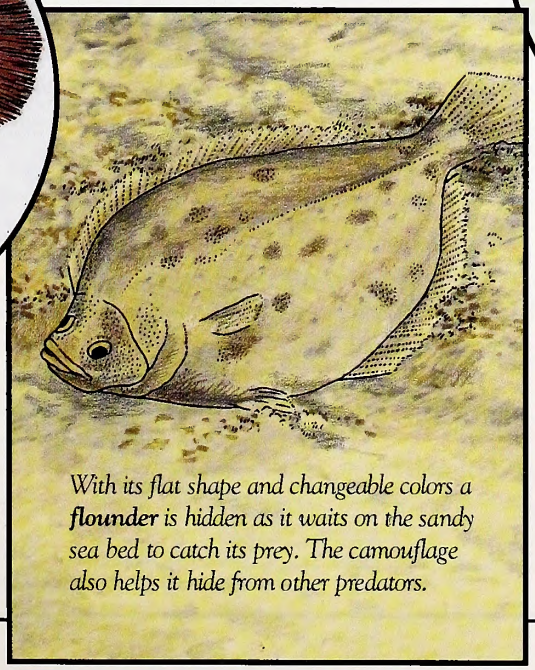


*By swimming in schools, **gizzard shad** find safety in numbers.*

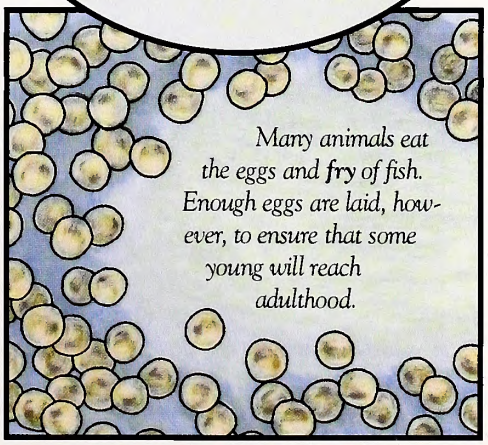


Comb-like gill rakers keep food from escaping through a fish's gills. In predator species that eat large food, the rakers are short and stubby; in plankton eaters they are long and fine.





*With its flat shape and changeable colors a **flounder** is hidden as it waits on the sandy sea bed to catch its prey. The camouflage also helps it hide from other predators.*



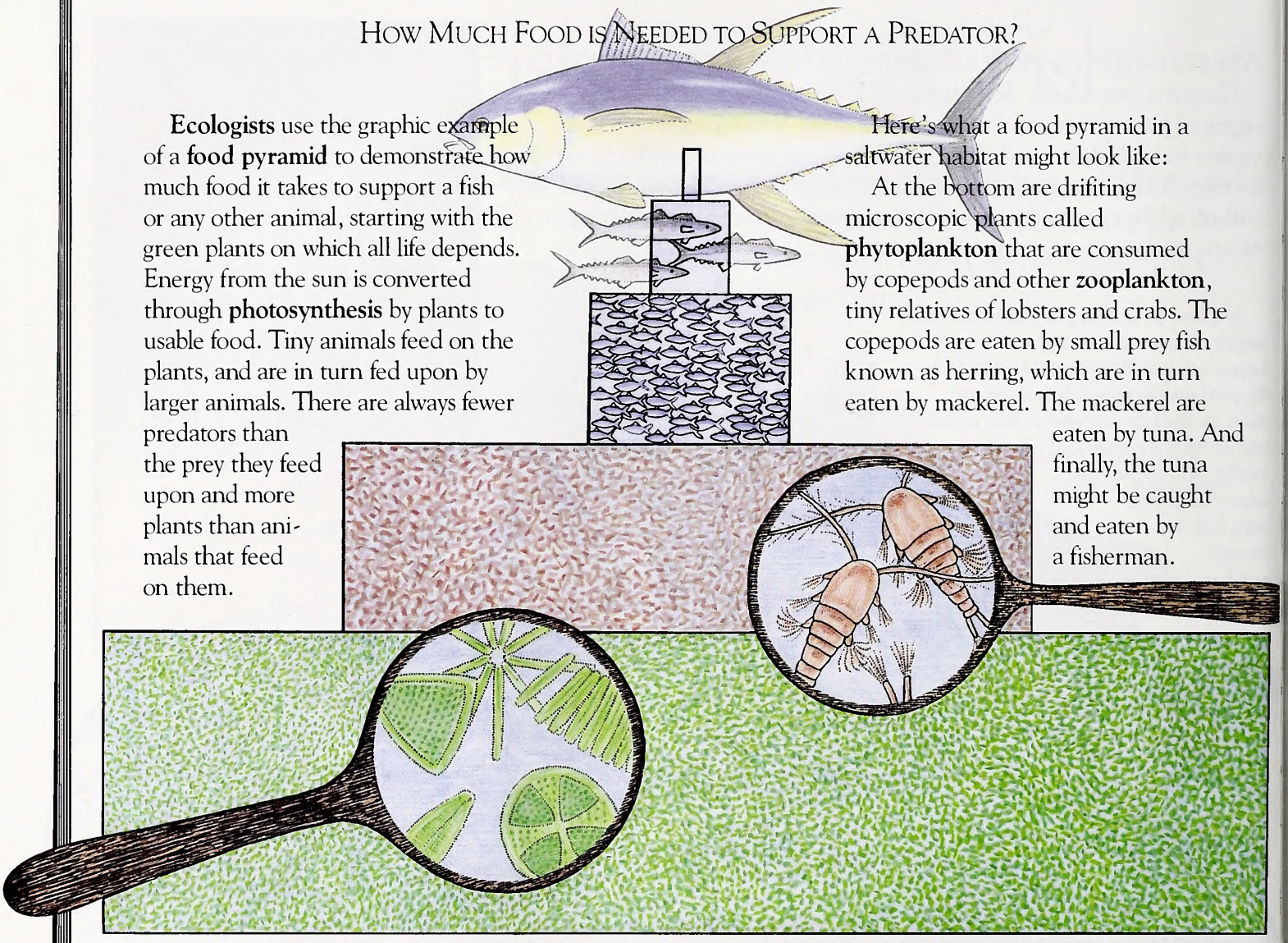
*Many animals eat the eggs and **fry** of fish. Enough eggs are laid, however, to ensure that some young will reach adulthood.*

HOW MUCH FOOD IS NEEDED TO SUPPORT A PREDATOR?

Ecologists use the graphic example of a **food pyramid** to demonstrate how much food it takes to support a fish or any other animal, starting with the green plants on which all life depends. Energy from the sun is converted through **photosynthesis** by plants to usable food. Tiny animals feed on the plants, and are in turn fed upon by larger animals. There are always fewer predators than the prey they feed upon and more plants than animals that feed on them.

Here's what a food pyramid in a saltwater habitat might look like:

At the bottom are drifting microscopic plants called **phytoplankton** that are consumed by copepods and other **zooplankton**, tiny relatives of lobsters and crabs. The copepods are eaten by small prey fish known as herring, which are in turn eaten by mackerel. The mackerel are eaten by tuna. And finally, the tuna might be caught and eaten by a fisherman.



Let's look at this food pyramid in actual numbers and find out what goes into producing a single tuna steak. It would take about 10,000 pounds of phytoplankton to feed 1,000 pounds of copepods. The 1,000 pounds of copepods could feed 100 pounds of herring which would feed just 10 pounds of mackerel. The 10 pounds of mackerel would produce only 1 pound of tuna flesh in a fish that can weigh several hundred pounds.

What Does It Mean?

aquatic: pertaining to water
predators: animals that hunt and feed upon other animals
prey: any animal that is hunted and consumed by other animals
camouflage: the use of color, pattern or shape to help an animal conceal its presence
schools: groups of fish that stay together
fry: young or hatchling fish
minnows: a term usually given to any small fish but more correctly applied to a specific group of fishes, some of which attain a large size
ecologists: scientists who study the interrelationships between plants, animals and their environment
food pyramid: a graphic representation of the relationship between organisms that feed on other organisms
photosynthesis: the process through which plants produce food in the presence of sunlight
phytoplankton: microscopic green plants that drift suspended in water
zooplankton: microscopic animals that drift suspended in water

Editing and design by Consie Powell. Art Puzzle by Anne Marshall Runyon.

Read and Find Out

- *Fishes* by Herbert S. Zim and Hurst H. Shoemaker, Golden Press, 1991.
- *Seashores* by Herbert S. Zim and Lester Ingle, Golden Press, 1989.
- *Who Eats What: Food Chains and Food Webs* by Patricia Lauber, Harper Collins Books, 1995.
- "Tools of The Trade," *Wildlife in North Carolina*, July 1984.
- "Life in a Trout Stream," *Wildlife in North Carolina*, March 1983.

It's WILD!

Project WILD activities for teachers and students that correlate to this topic include:

Fishy Who's Who: teaches students to recognize and identify major species of freshwater or saltwater fish.

Fashion A Fish: teaches students to recognize how fish adapt to their environments.

Water We Eating?: teaches students to identify foods derived from aquatic sources and of the importance of aquatic environments as food sources.

Net Gain, Net Effect: teaches students about the evolution of human fishing techniques and the effects of changes in technology on fish populations.

Get WILD

The Wildlife Commission will hold a series of advanced N.C. WILD workshops for educators in the coming months. They include:

April 24-25—*Salamanders: To Know Them Is to Save Them*, New River State Park, Jefferson - Jan Cortelyou Lee (919) 541-5393.

June 1-3—*Coastal Aquatic Ecosystems of the Lower Neuse River*, Camp Don Lee, Oriental - Laurieann Phalen (919) 249-1106.

June 29-July 1—*Mountain Stream Ecology*, Pisgah Center for Wildlife Education, Pisgah Forest - Laura Elliott (704) 877-4423.

To sign up or to learn more details, call the listed contact or check our web page at **http://www.sips.state.nc.us/Wildlife/ConservationEd/wild/calendar/**

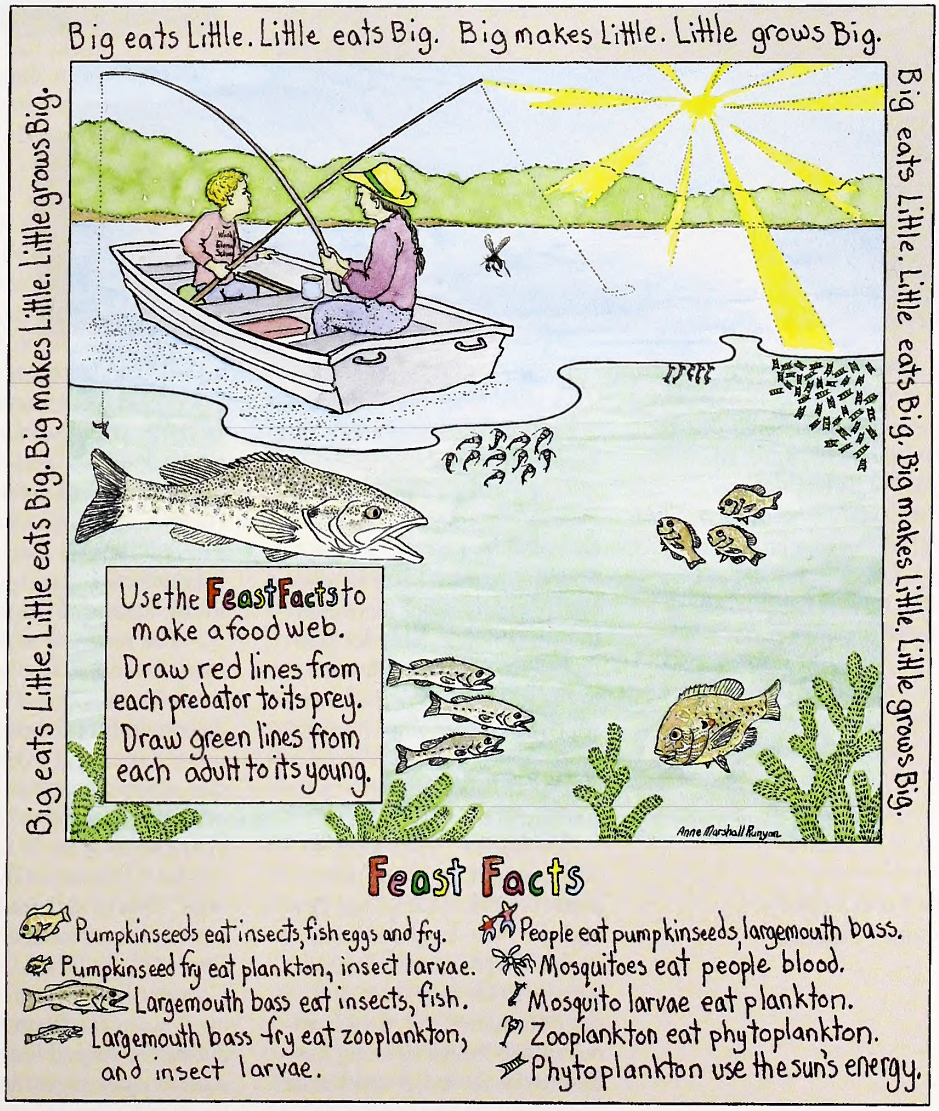
Get Outside

Go fishing: When you catch a fish, look at it closely. Mouth size, body shape and gill rakers will help you determine if it is a predator or prey fish.

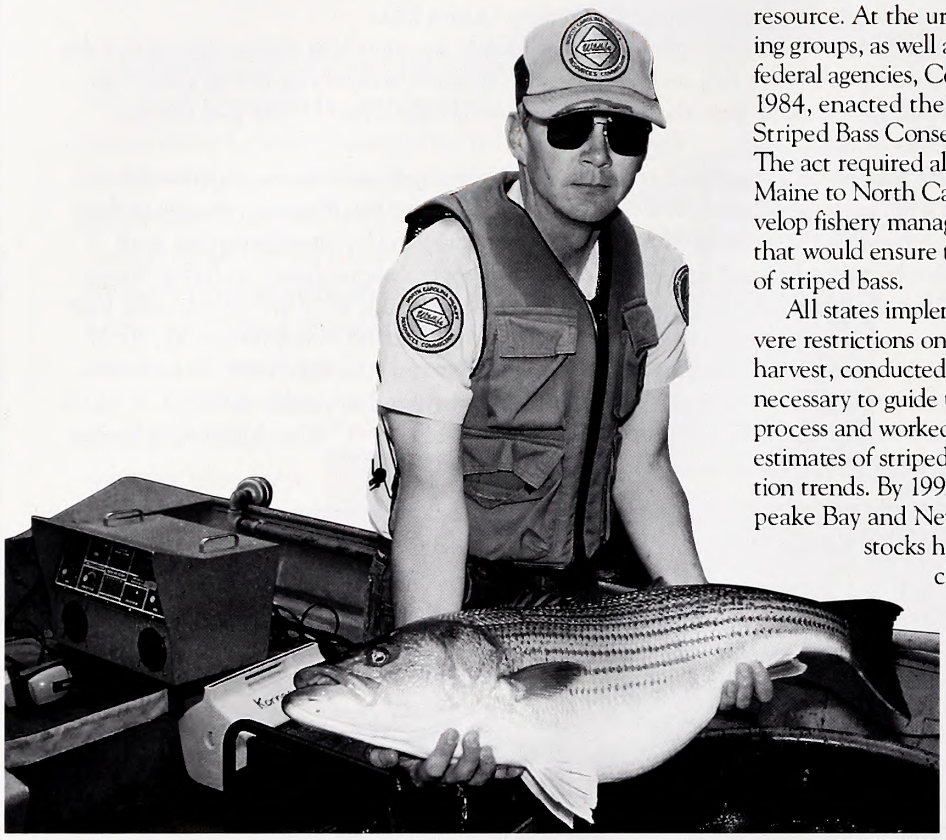
Watch fish: Go to a zoo, nature center or public aquarium that displays fish, or to a pet store that specializes in fish, and see what you can learn by observing fish up close. Can you pick the predators from the prey? Do they avoid each other? Do the prey fish stay together or hide?

Be a predator, eat a fish: If you go fishing, clean, cook and eat your very own fish, or buy a fish at the fish market. Roll the cleaned and skinned fish fillets in a mixture of flour and corn meal. Place the fish in a lightly greased skillet and fry on medium heat until golden brown on each side. Add a little salt and pepper, or lemon juice, and chow down!

Visit the Museum: Create a fish print and take home a work of art! As you make your print, museum educators will help you identify parts of the fish's body (Feb. 6, 13, 20, 27 from 10 a.m.- noon). Come learn about the predators at the high levels of the food pyramid, including sharks, bass, pickerels and some land and air predators (Feb. 1, 8, 15, 22 from 2-2:30 p.m. and 3-3:30 p.m.). All programs are free. N.C. State Museum of Natural Sciences, Raleigh. For more information, call (919) 733-7450.



Albemarle/Roanoke Striped Bass Population Declared Recovered



RODNEY FOUSHEE

***The Albemarle** Sound/Roanoke River striped bass population has recovered to historic levels thanks to the joint management efforts of the N.C. Wildlife Resources Commission and the N.C. Division of Marine Fisheries. The survival of large female stripers like this 25-pounder (above) has been one of the keys to the recovery.*

Written and Edited by Rodney Foushee

Anglers who fish the Roanoke River and Albemarle Sound can expect to catch and keep more striped bass this spring.

The Atlantic States Marine Fisheries Commission has determined that the Albemarle Sound/Roanoke River striped bass population has recovered to historic levels. This decision represents another milestone in the recovery of striped bass, which have been important to North Carolina commercial and sport fishermen since the colonial era.

During the 1970s, striped bass populations in the Albemarle Sound, Chesapeake Bay and the New England states declined significantly. Because stripers freely migrate in and out of estuaries and across various state boundaries along the Eastern Seaboard, a multi-state approach to management was needed to restore this valuable resource. At the urging of fishing groups, as well as state and federal agencies, Congress, in 1984, enacted the Atlantic Striped Bass Conservation Act. The act required all states from Maine to North Carolina to develop fishery management plans that would ensure the recovery of striped bass.

All states implemented severe restrictions on striped bass harvest, conducted research necessary to guide the recovery process and worked together on estimates of striped bass population trends. By 1995, the Chesapeake Bay and New England stocks had been declared recovered and harvest restrictions were relaxed.

North Carolina's striped bass recovery plan has been in effect since 1993, but measures to restore the population began in the early 1980s. The N.C. Wildlife Resources Commission and the N.C. Division of Marine Fisheries jointly manage the fishery for the state and share in the success of the recovery.

"The recovery of the Albemarle Sound/Roanoke River striped bass population is the direct result of cooperation involving state and federal agencies, utility companies, and especially our fishermen," said Fred Harris, chief of the Wildlife Commission's Division of Inland Fisheries. "We've had great cooperation from North Carolina Power Co. and the U.S. Army Corps of Engineers in regulating flows in the Roanoke River during the striped bass spawning season. Anglers on the Roanoke River and other waters have cooperated with strict harvest limits, knowing that their efforts would help the restoration."

Preston Pate, Jr., director of the Division of Marine Fisheries, agrees with Harris. "Fishermen and associated economic interests in the Albemarle Sound and surrounding waters have shown great cooperation with our efforts," Pate said. "Commercial and recreational fishermen who fish in the Albemarle Sound, as well as fisheries managers, have anxiously awaited this decision. This historic recovery shows that management plans work."

Both Harris and Pate agree that fishermen can now expect to harvest more striped bass this spring. The Wildlife Resources and Marine Fisheries commissions have recommended increasing the harvest quota to 250,880 pounds for 1998—a 60 percent increase over last year's overall harvest. This amount will also be evenly split between commercial and recreational fishermen.

Last year, anglers were allotted 29,000 pounds of striped bass on the Roanoke River and recreational fishermen were allowed to harvest the same amount from Albemarle Sound. With the proposed increase, recreational anglers will be allowed to take 62,720 pounds from the Roanoke River and an additional 62,720 pounds from Albemarle Sound. The Atlantic States Marine Fisheries Commission must still approve the increase.

The spring fishing season on the Roanoke River will be set in the coming weeks by proclamation from Charles Fullwood, the Wildlife Commission's executive director. The season usually opens in early March.

—Some information provided by the N.C. Division of Marine Fisheries

A True Calling: Tribute to a Tar Heel Wildlife Officer

by Eugene Price

"I want to be a game warden." These were the first words I ever heard from Allen Faircloth.

Allen was 36. He had a family and a job paying more than he would earn as a law enforcement officer. And of the several hundred who would apply for the training school, only 25 would be chosen.

"But this is what I have always wanted to be," he said earnestly.

His wife, Diane, who had a good job at Wayne Memorial Hospital, was fully supportive.

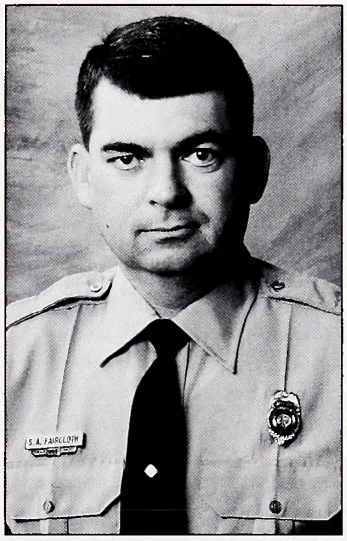
I told him how to apply and wished him good luck. A few weeks later he was back in my office. He hadn't made the cut. The push-up or pull-up requirements had been out of the reach of his 36-year-old arms.

"They'll have another school in two years. I'll be ready," he assured me. "I'm going to be a game warden."

In the months that followed, he could be found at the Family YMCA exercise room or running. Push-ups, pull-ups, weights, sprinting. After all, when the next test came, the other candidates would be in their early 20s. He would be 38.

The time came and Allen Faircloth stood with the far younger applicants. Their eyes —and those of the training officers—widened as he aced the physical. Later he was to labor through the academics and manage to graduate in the upper group of his class.

He became one of the Wildlife Commission's most promising officers. He took on the added duty of dog handler. Wherever his duties took him, his wife and family followed with enthusiastic support. Allen kept in touch with his home folks, sharing with them his excitement and the pride he had in his job.



MELISSA McGAW

***Allen Faircloth** answered his true calling by becoming a North Carolina wildlife enforcement officer.*

Then the call came.

Officer Faircloth, I was informed, had a problem—leukemia. But there was real hope. His brother would be a bone marrow donor. At Duke Medical Center, things went well. When folks called, Allen's response was not only upbeat, it was enthusiastic. "I'm doing great. Better every day. Can't wait to get back on the job!"

That was his attitude when he applied—from his hospital bed —to be assigned to fill a vacancy back home in Wayne County.

"I can't wait to get back," he gushed from his room near the hospital.

He was to report on Sept. 1. But he remained weak. The doctors wanted to monitor him a bit longer. Then it was October. He and I chatted by phone. "I'm getting stronger every day," he assured me. And I told him how excited his friends were that he'd be coming home.

The days built into weeks. Frost kissed the forests, and the trees shed their crimson, gold and brown leaves and it was November. And there was another change. The doctors at Duke had applied every technique known to modern medicine as they monitored the charts of one their most valiant and determined patients.

And then it was December . . . . Wildlife Enforcement Col. Roger LeQuire called me at night at home. "I'm sorry to call, but I knew you would want to know—Officer Faircloth . . . ."

The colonel didn't have to finish.

It was a moving ceremony at Seymour Funeral Home and at the cemetery in Pikeville. More than 100 wildlife officers filled half the chapel while others stood as honor guards. White-gloved canine officers were pallbearers. And standing vigil by the coffin was an honorary pallbearer—Lancer, Allen Faircloth's dog and faithful, obedient companion.

As the motorcade wound its way toward Pikeville, Goldsboro police officers were standing at attention and saluting at every intersection. Fellow wildlife officers stood in rigid formation at the cemetery as a bagpiper, in full Scottish attire, played a tribute to their lost comrade.

On that clear, brisk and cold Sunday afternoon at Pikeville cemetery, we buried him in the wildlife officer's uniform he had worn for only three years. But no one had loved it more or wore it more proudly or more deservedly, however briefly, than Allen Faircloth.

—Wildlife Enforcement Officer Allen Faircloth succumbed to leukemia Dec. 4. He was 41. He is survived by his parents, wife and two sons.

Eugene Price is a longtime member and past chairman of the N.C. Wildlife Resources Commission. He is also editor emeritus of the Goldsboro News-Argus. *(story reprinted with permission from the* News-Argus*)*

Calendar

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

Feb. 13-15

The Southeastern Wildlife Exposition in Charleston, S.C., will feature more than 500 exhibitors and $20 million in wildlife art, decoys and collectibles. For more information, write the exposition at 211 Meeting St., Charleston, S.C., 29401, or call (803) 723-1748.

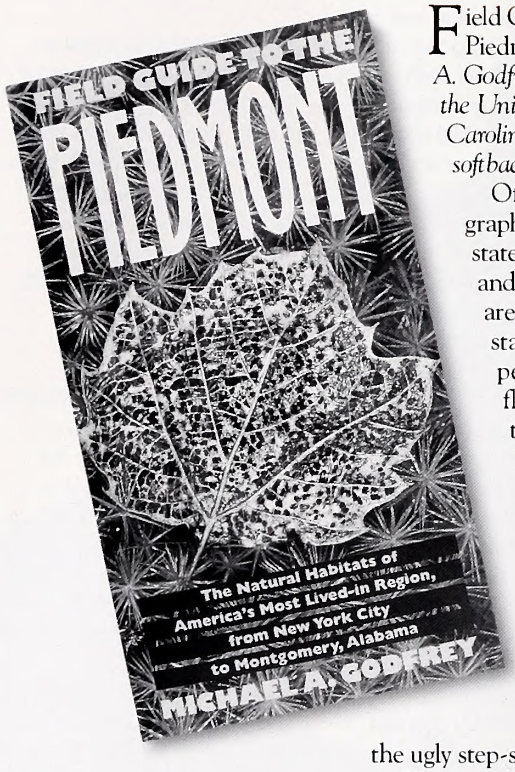
Feb. 21-23

The N.C. National Bird Hunters Association will hold its N.C. State Classic walking field trial event in Hoffman. For more information, call Cliff Monroe at (704) 434-5402.

Feb. 27- March 1

The 18th annual Dixie Deer Classic will be held in the Jim Graham building at the North Carolina State Fairgrounds in Raleigh. The event is one of the nation's largest deer hunting expositions and draws thousands of hunters each year. For more information, call (919) 782-5333.

Book Review: *Field Guide to the Piedmont*



Field Guide to the Piedmont by Michael A. Godfrey, reprinted by the University of North Carolina Press, 524 pages, softback, 1997, $19.95.

Of the three physiographic regions of the state, the Mountains and the Coastal Plain are the indisputable stars. Millions of people each year flock to both areas to surf the waves, hike the trails and look for their sporting adventures. Many consider the Piedmont—a highly developed region in between these two—the ugly step-sister.

This reprint of Mike Godfrey's classic *Field Guide to the Piedmont* may not change many opinions, but it succeeds in making the Piedmont a much more interesting place than first considered.

From New York City to Montgomery, Ala., the Piedmont's landscape of gently rolling hills encompasses one of the most populous regions on the East Coast. Its good soils and easy terrain made it desirable by Native Americans long before the Europeans began to push up the rivers and creeks from the coast. Godfrey makes the point that few parts of the Piedmont have escaped the plow or the ax for centuries.

Godfrey is a wonderful tour guide, taking the reader through the geography and geology of the region, across its cultivated lands and into some of the Piedmont's "special places" such as its granite outcrops. He covers the region's animal and plant life equally well and shows the incredible diversity of such common places as hedgerows, hayfields and pastures.

Most fascinating, perhaps, is his section on plant succession. It is in the Piedmont, with its history of disturbance, that the forces of succession are perhaps most evident. Everywhere you look, bare fields are being colonized by plants, young forests are becoming juvenile forests and, in general, nature is visibly moving from one stage to another. That's the meaning of succession and Godfrey examines it with detail and lucid description.

Stylistically, Godfrey is a delight. He writes a muscular, graceful prose that is always new, never hackneyed or cliched.

For the serious naturalist, and for the person interested in North Carolina, *Field Guide to the Piedmont* is indispensable.

—Lawrence S. Earley

Grouse Hunting Success Improved Last Year

North Carolina grouse hunters proved successful last year—encountering 25 percent more birds than in the previous season, according to the Wildlife Commission's annual Avid Grouse Hunter Survey.

Hunters who participated in the survey reported flushing 5.4 birds per trip—up from 4.65 birds per trip for the previous season. The flush rate for 1996-1997 was also 6 percent above the long-term average. Wildlife biologists use the survey, now in its 14th season, to measure ruffed grouse hunting success and population trends in North Carolina.

During the 1996-1997 season, 92 participating hunters reported taking 1,647 hunting trips in 23 western counties. They harvested 1,152 grouse, or 0.7 birds per trip by their respective hunting party—up 5 percent over the previous season.

Flush rates and harvest rates were lowest at the beginning of the season in October when hunters reported flushing only 3.47 birds per trip and bagging 0.4 birds per trip on 285 hunts. Success rates continued to rise through most of the season and peaked in February, when hunters reported flushing 6.03 birds per trip and harvesting 0.83 birds per trip during 768 hunts.

ILLUSTRATED BY KIMBERLY K.C. SCHOTT

As in past years, hunters in the southern mountain counties reported higher flush and harvest rates than those in the northern mountains. Hunters statewide also flushed and bagged about 15 percent more grouse per trip when hunting on private lands compared to trips on public game lands.

Environmental Education Grants Available

Thanks to the N.C. General Assembly, more than $200,000 is available to improve library resource materials and promote environmental education.

Project Tomorrow Environmental Education grants up to $1,500 are available to schools, public libraries and environmental education centers to build and improve library resource materials. The Project Tomorrow Bibliography recommends publications for creating an outstanding library collection. A portion of the awards can also be used for student field trips to environmental education centers.

The deadline for grant applications is Feb. 14. To receive an application and bibliography, call the N.C. Office of Environmental Education at 1-800-482-8724.

Working for Wildlife

Volunteers are needed at the Wildlife Commission's Pisgah Center for Wildlife Education by March 1, when the center's indoor and outdoor exhibits areas will be fully open to the public.

The education center, located near Pisgah Forest in Transylvania County, is designed to explain through exhibits and programs how human activities have an impact on wildlife and the natural environment and why these resources need to be thoughtfully managed.

Volunteers will be a vital part of the wildlife center's success. There are a variety of volunteer opportunities available including: V.I.P. (Visitor Interpretive Personnel), exhibit gardening and information desk/WILD store personnel. To join our volunteer team, call (704) 877-4423.

Wildlife Commission Honors John Lentz

MELISSA McGAW

***Former North Carolina Wildlife Resources Commission Chairman** John Lentz (right) was recently honored for his tireless efforts for wildlife management and education by having the shooting facility at Millstone 4-H Camp near Hoffman named after him. Wildlife Chairman Jim Bennett was also on hand for the dedication.*

Field Notes

Rabbit	Through Feb. 28
Raccoon and Opossum	See *Regulations Digest*
Bobwhite Quail	Through Feb. 28
Ruffed Grouse	Through Feb. 28
Common Snipe	Through Feb. 28
Crow	See *Regulations Digest*
Waterfowl	
Snow and Blue Geese	Through March 10

Information on bag limits and other regulations may be found in the *1997-98 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission. **For more information on waterfowl regulations and limits, call 1-800-675-0263.**

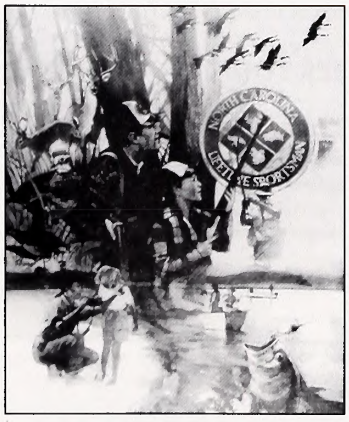
Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report



Totals Through November 1997

Principal Balance
$24,489,643.09

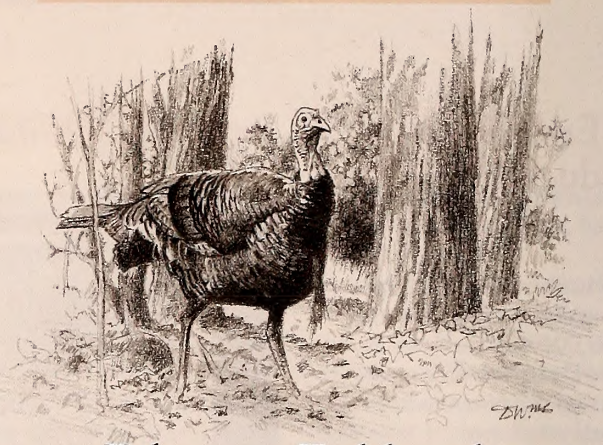
Interest Earned
$24,557,389.62

Total Receipts
$49,047,032.71

Interest Used
$12,329,807.04

Fund Balance
$36,717,225.67

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



February Fieldwork

by Rodney Foushee

Despite the cold chill in the air, now is one of the best times to start improving fish and wildlife habitat on your land. Here are some tips to ensure you will have plenty of both throughout the year.

Prescribed Burning: The benefits of prescribed burning should be crystal clear after reading this issue of *Wildlife in North Carolina*. You should begin burning now through March to burn back small hardwoods in Coastal Plain and Piedmont pine forests. The additional sunlight that reaches the forest floor will create a bonanza of seed-producing grasses and weeds that, in turn, will provide excellent food and cover for rabbits, quail, young turkeys and songbirds.

But before you burn, you need to coordinate your activities with the N.C. Division of Forest Resources. Check with your county forest ranger for the proper burning permits and other technical information. Your district wildlife biologist can also provide valuable tips on setting up a long-term burning plan for your land.

Farm Pond Fill-ups: Drawing down the water level of your favorite fishing pond during the winter is an excellent way to kill unwanted submerged aquatic plants and improve the fish population balance. Now is the time to reverse the process so that spring rains will have plenty of time to refill the pond before spawning begins. This means you'll need to plug the drains in your water-control structure by the beginning of March.

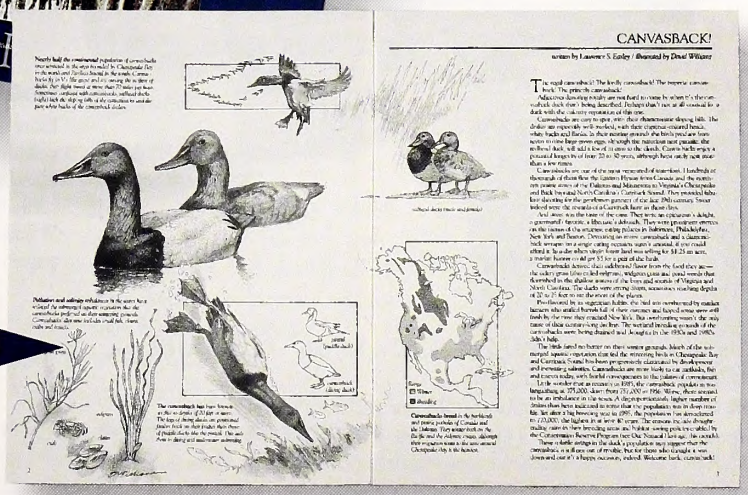
Releasing Fruit Trees: In the fall, you marked neglected and overgrown fruit trees for "releasing" later in the winter. Now is the time to get back into the woods and prune those abandoned apple trees and overgrown wild fruit trees while they're still dormant.

To properly release a fruit tree, first cut back larger trees and bushes that overhang or touch the desired tree. Then remove any vines that choke the tree and block out sunlight. Finally, cut away all dead or broken limbs and prune back exterior branches so the center of the tree gets plenty of light.

A small chainsaw, a pair of pruning shears and an afternoon in the woods can go a long way to boost fruit production, in turn improving wildlife habitat on your land.

N.C. WILD STORE

Explore the Mysteries of Nature



Short essays and beautiful illustrations have been the formula to the popularity of "Nature's Ways" over the years. This article on the comeback of the canvasback duck in North Carolina is one of over 200 articles in the collection. They can easily be photocopied and used in the classroom, and parents and children also can read them together at home.

NATURE'S WAYS
Natural History Essays from Wildlife in North Carolina

Why do some birds decorate their nests with snake skins? Why is the Roanoke bass found in only a few rivers in North Carolina? How did the ivory-billed woodpecker become extinct?

For nearly 20 years, the illustrated "Nature's Ways" columns in the pages of *Wildlife in North Carolina* have answered scores of questions like these in brief, entertaining essays. Now more than 200 of these essays have been collected in six paperback volumes that will delight readers, young and old, with their eye-opening insights into North Carolina's natural curiosities.

A wonderful gift for every nature lover!

Sold only as a 6-volume set. $27.50.
ITEM CODE M9

More terrific items ☛

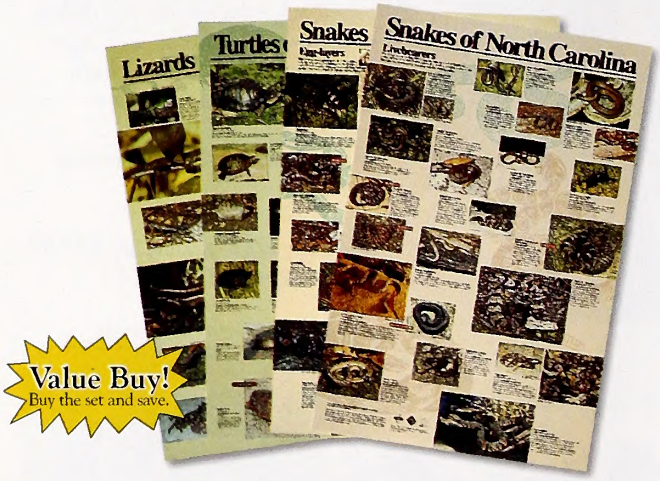
All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

White, 100% cotton (preshrunk) T-shirts are guaranteed for comfort and durability. Each shirt features an original design.

N.C. WILD T-SHIRT
N.C. WILD logo printed on front and colorful art on back. $14.50.
ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE IN N.C. T-SHIRT
WINC magazine logo on front pocket. Tundra swan art on back. $14.50.
ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)



LIZARDS OF N.C.
Shows all 12 of the state's lizard species. 22" x 34". $6. ITEM CODE **P3**

TURTLES OF N.C.
Shows all 21 of the state's turtle species. 22" x 34". $6. ITEM CODE **P4**

SNAKES OF N.C. (LIVEBEARERS)
Shows all 17 of the state's livebearing snake species. 22" x 34". $6. ITEM CODE **P5**

SNAKES OF N.C. (EGGLAYERS)
Shows all 19 of the state's egg-laying snake species. 22" x 34". $6. ITEM CODE **P8**

SET OF 4 POSTERS
You'll save $6 by purchasing the set of four posters above. $18.
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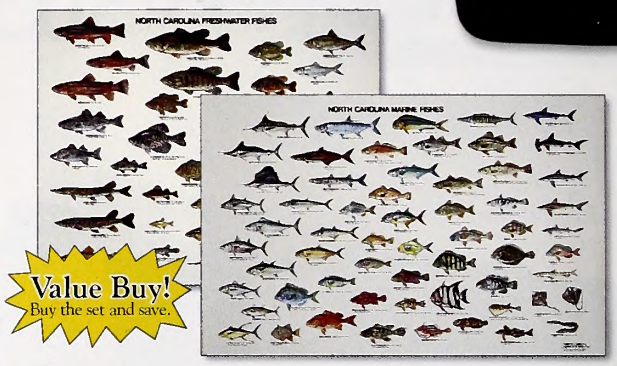
N.C. WILD CAP
N.C. WILD logo is embroidered on a pro-shape, brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. $16.50.
ITEM CODE **A1**



N.C. FRESHWATER FISHES
Find your favorite fish with this color poster showing 36 of the state's freshwater fishes. 28" x 22½". $6. ITEM CODE **P6**

N.C. MARINE FISHES
All the colors of the sea can be found on this poster of 60 marine fishes. 35" x 22½". $6. ITEM CODE **P7**

N.C. FRESHWATER FISHES AND N.C. MARINE FISHES
Save $2 when you buy both posters as a set. $10. ITEM CODE **P9**

WILDLIFE IN N.C. CAP
Buck deer silhouette with magazine logo is embroidered on a pro-shape, washed-canvas cotton cap with an adjustable cloth strap and buckle closure. Two-tone cap is navy/stone. $16.50.
ITEM CODE **A2**

DOGS THAT POINT, FISH THAT BITE
Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission; hardbound; 220 pages. $19.95. ITEM CODE **M8**

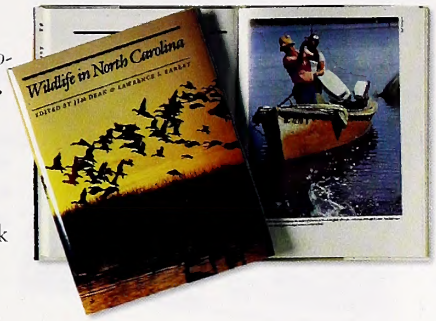
WILDLIFE IN N.C. CAP
Brook trout and magazine logo are embroidered on a sage-colored, premium weight, pigment-dyed, brushed cotton cap with an unstructured front, an extended bill, and a nubuck suede closure. $16.50. ITEM CODE **A3**

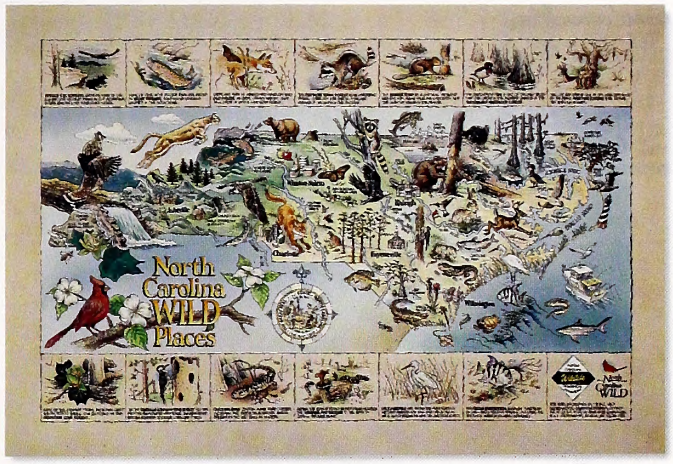
Wildlife in North Carolina Book

The best of *Wildlife in North Carolina* magazine. Hardbound. $12.
ITEM CODE M3

Magazine Binder

Store 12 issues of the magazine in this sturdy brown leather-look binder with gold lettering. $10.
ITEM CODE M2





North Carolina WILD Places Map

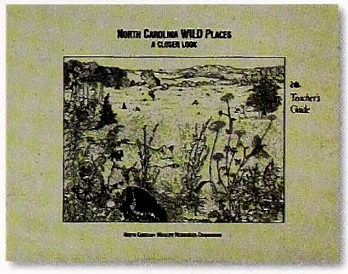
Artist's Proof. $40. ITEM CODE E2
Limited Edition. $25. ITEM CODE E3
Poster. $6. ITEM CODE E4

Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.
ITEM CODE M6

North Carolina WILD Places: A Closer Look Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. $6.
ITEM CODE E7



North Carolina WILD Places Posters

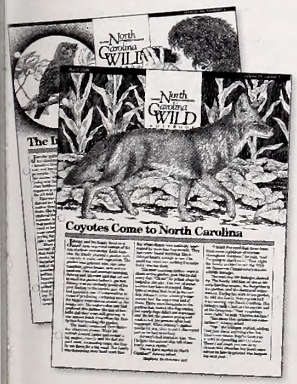
(Set of 3): Posters of "Old Field" and "Mountain Cove Forest" from *North Carolina WILD Places: A Closer Look.* 19½" x 16". Shipped folded with poster version of WILD Places Map. $8. ITEM CODE E5

North Carolina WILD Places: A Closer Look

Easy-to-read text and Anne Marshall Runyon's delightful illustrations make wildlife habitats come alive in this 82-page book. Discusses 13 habitats across the state. $10.
ITEM CODE E1

WILD Places book and posters

Buy the *North Carolina WILD Places* book and all three posters and save! (Items E1 and E5) $16. ITEM CODE E6



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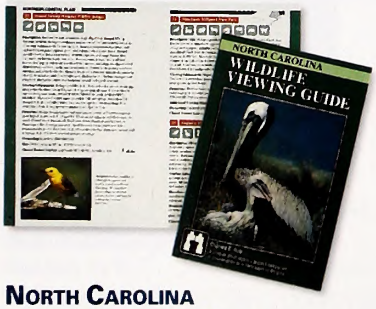

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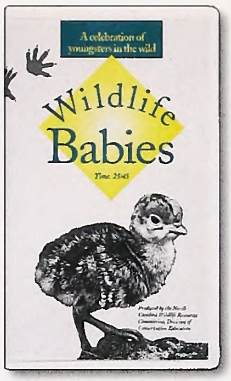

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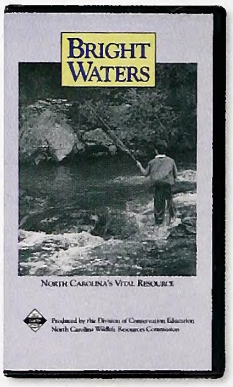

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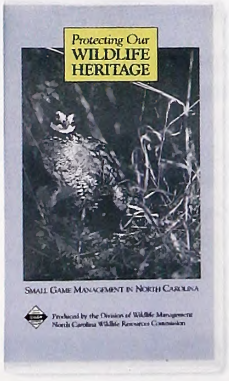

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ENDOW 98

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Wildlife Commission

Spotlight

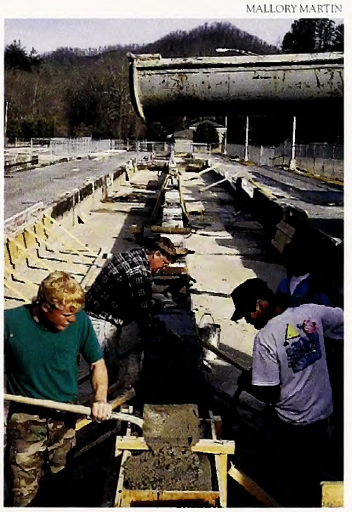
Trout Hatcheries for the Future

MALLORY MARTIN

Significant improvements have already been made as part of the Commission's long-term hatcheries maintenance plan.

Periodic upgrades in facilities and equipment help industries improve efficiency and stay in business. The N.C. Wildlife Resources Commission is now taking the same approach at its mountain trout hatcheries.

MALLORY MARTIN



The Commission's four coldwater hatcheries, located in Burke, McDowell and Transylvania counties, are between 35 and 70 years old. Portions of the hatchery system have deteriorated seriously after a half century of continuous operation. Some water intakes and pipelines have exceeded the operational life for which they were designed.

Significant improvements have already been made as part of the Commission's long-term hatcheries maintenance plan. These include:

KEN TAYLOR

- emergency repairs to water intakes
- planning for long-term redesign and renovation
- purchase of new feed storage facilities
- improvements in employee residences
- repair of deteriorated concrete raceways
- installation of a liquid oxygen injection system at Pisgah Hatchery
- completion of a year-long engineering and planning study.

It is expected to take an additional five years to accomplish all the activities recommended by the engineering study. Once completed, the results will ensure our hatcheries remain operational well into the 21st century.

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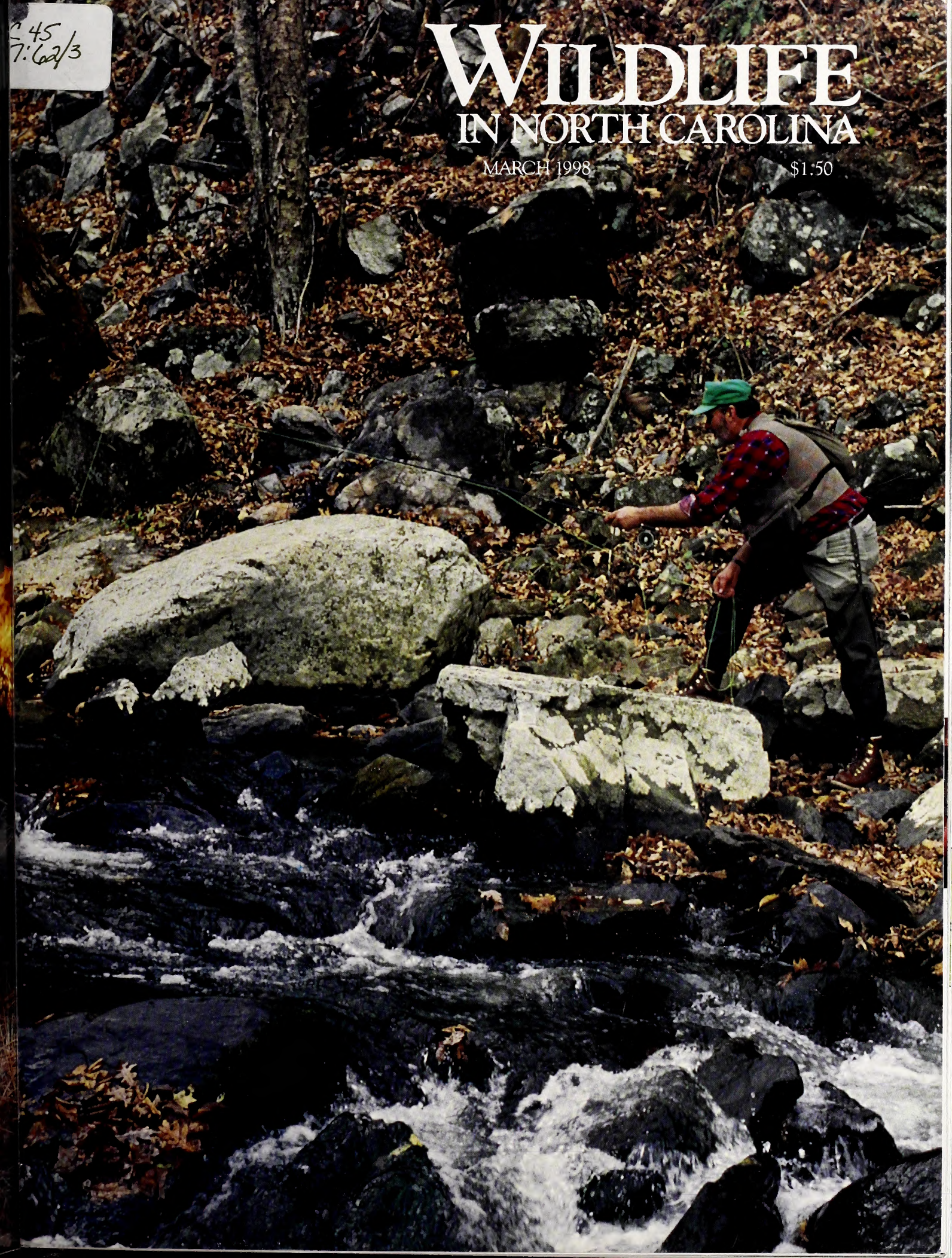
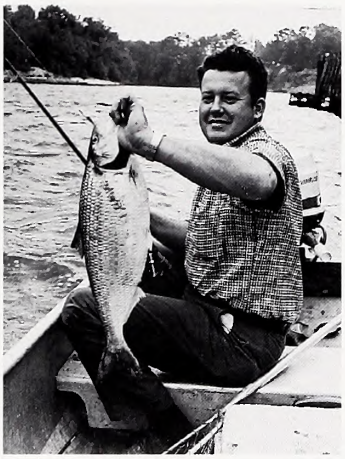
WILDLIFE IN NORTH CAROLINA

MARCH 1998 $1.50



Pushing Your Luck

by Jim Dean ©1998



JIM DEAN

"There are those who would say there are two kinds of fishermen —those who can't wait, and those who can. I don't personally know any of the latter, or want to."

For fishermen, the months after Christmas pass at a glacial rate. By the time March arrives, the need to fish is epidemic. It little matters that winter lingers like a bad case of flu. We must fish. Now. If you've been eyeing the angelfish in your kid's tropical tank, check out these opportunities.

Hickory and American shad. Hickory shad are already climbing our coastal rivers and smaller tributaries to spawn, and their larger American (white) shad cousins will soon follow. If rivers don't flood excessively and become overly muddy, fishing can be outstanding. Ultra-light spinning gear with 4- or 6-pound test monofilament is a sporting choice for hickories. Small shad darts or jigs with curly soft plastic tails and spoons like the No. 1 Reflecto work great, and many fishermen rig them in tandem with the spoon trailing the dart. Heavier spinning tackle with at least 8-pound test is a better bet for white shad. Some fishermen have also had good luck with brightly colored, weighted flies, but only where waters are relatively clear.

A partial list of rivers with shad runs would include the Chowan, Roanoke, Tar, Neuse, Trent, Whiteoak, Northeast Cape Fear and Cape Fear, and the best spots are often at the mouths of tributaries.

Striped bass. The legendary spawning run of stripers (rockfish) in the Roanoke River has been restored, and fishing can be good from Hamilton upstream early, with peak spawning occurring in April at Weldon and good success sometimes continuing into early June. Live shad, cut bait and bloodworms all produce, but large jigs with curly soft plastic tails offer great sport. Fishermen who remember this river as a polluted, muddy mess will be surprised at the clear water, and fly fishing with fast-sinking lines and big colorful streamers is increasingly popular, producing astonishing catches. Be sure to check regulations and always play it safe on this dangerous river.

White Bass. Tributaries flowing into lakes with populations of white bass are good bets for some hot fishing in March. That's the time of year the fish run up these streams to spawn. Some spots—the Haw above Jordan Lake and the Uwharrie out of Tillery—can be waded if you're careful, but others require a boat. Light spinning tackle and small jigs, plugs and spoons are ideal, but flies sometimes work, too. The fish seldom run large, but if you hit the run at its peak, fishing can be memorable.

Crappies. These popular panfish spawn early in our lakes, moving to the shallows around cover along shorelines this month. A light spinning rod and 4- to 6-pound mono with small curly tailed jigs or Beetle-Spins will do the job. If you don't find fish shallow, try deeper water around standing timber, bridge pilings or other similar cover. Many fishermen use live minnows, but you can also rig a jig under a sliding float to pinpoint deeper fish. Rigged properly, the float will slide down to the lure making it easy to cast, and if you knot a short piece of string or rubber band to your line, the lure will always drop to the desired depth. It's a versatile, deadly tactic.

Largemouth bass. No, you're definitely not jumping the season to start bass fishing, especially for lunkers—in fact, you may already have missed several good weeks. Well before they spawn, large female bass make forays into very shallow water to look for spawning sites, usually around brushy cover. Cold fronts will drive them back to deeper water, but if you can fish on the heels of a spell of warmer weather, you are likely to have good luck around shallow cover using a spinnerbait, jig-and-pig or soft-plastic salamander. In big lakes, lunkers are also often caught on windy shores, particularly along rip-rap, using spinnerbaits, Rat-L-Traps and similar rattling divers. If you like topwater action, a noisy buzzbait like the Lunker Lure will often catch bass long before other surface lures produce.

If you also like to catch chain pickerel—some of us do—March is one of the few months you can expect predictable action with these toothy predators. Use a spinnerbait or diving minnow imitation, and expect the best action along windy shorelines with lots of cover. In waters that harbor both bass and pickerel, mixed bags aren't unusual.

Mountain trout. With many streams now open all year, you don't have to wait for opening day in April. During those periodic warm spells in early spring, trout often feed actively even sometimes on dry flies. Pressure is light and fishing is often terrific.

Too early to fish? There are those who would say there are two kinds of fishermen—those who can't wait, and those who can. I don't personally know any of the latter, or want to.

CONTENTS

WILDLIFE IN NORTH CAROLINA

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March 1998 *Volume 62, Number 3*

FEATURES

4 **Bald Eagle on the Comeback Trail** *by Rodney Foushee*

Virtually eradicated in North Carolina nearly three decades ago, the

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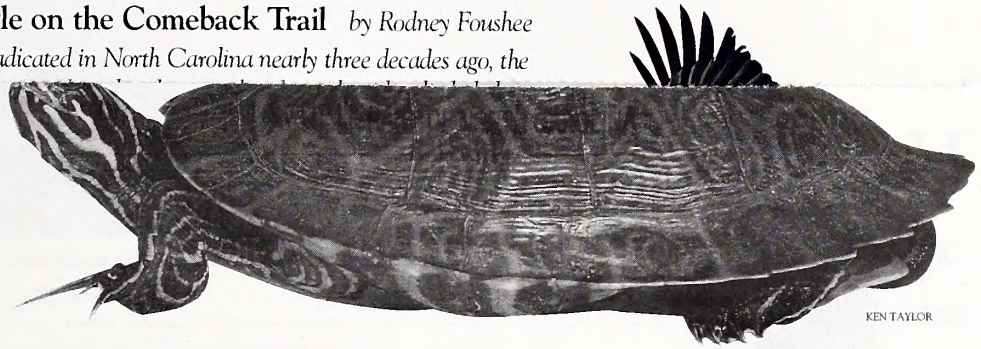

KEN TAYLOR

Fact: *In winter, this river cooter hibernates in muddy sediments at the bottoms of our rivers and streams. Its metabolism slows so much that it can remain underwater safely for weeks, even months. It absorbs oxygen through its skin.*

Each issue, *Wildlife in North Carolina* will tell you many facts of interest about our state's wildlife and we'll inform you about how we're managing our game and nongame species. We'll entertain you with articles about hunting and fishing, natural areas, outdoor recreation and conservation efforts around the state. And our great color photographs will astonish you with their beauty.

And check out our section for youngsters! We've just added four pages of colorful illustrations and easy-to-read text that will fascinate even the youngest reader in the house.

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Pushing Your Luck

by Jim Dean ©1998

For fishermen, the months after Christmas pass at a glacial rate. By the time March arrives, the need to fish is epidemic. It little matters that winter lingers like a bad case of flu. We must fish. Now. If you've been eyeing the angelfish in your kid's tropical tank, check out these opportunities.

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Contents

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Features

4 **Bald Eagle on the Comeback Trail** *by Rodney Foushee*
Virtually eradicated in North Carolina nearly three decades ago, the bald eagle has made a slow but steady rebound, with a little help from some friends.

10 **Flies and First-Day Trout**
written and photographed by Jim Dean ©1998
Bad weather, crowds and high water are what you can expect on a typical Opening Day. Bet you can't wait!

16 **The Firstest Aid of All** *written by Burt Kornegay* ©1998
illustrated by Chris Armstrong ©1998
You've got the painkillers and the sterile bandages, the splints and the Ace wraps. But before you pick up your backpack, consider these tips for an injury-free outdoor experience.

20 **What Do We Do Now?** *written by Celeste Wescott Maus*
photographed by Ken Taylor
Educators are discovering that advanced workshops are highways to a deeper understanding of wildlife and other natural resources.

24 **Sing a Song of Redbirds** *written by David Lee* ©1998
photographed by Dave and Steve Maslowski ©1998
If it's red and at your feeder, chances are it's a male cardinal, North Carolina's state bird. But watch out! At this time of year, it's hopped up on hormonal high-drive.

page 4

page 24

page 10

Departments

Our Natural Heritage *by Jim Dean* ©1998 ..... **inside cover**
Nature's Ways *by Jeff Beane* ©1998 2
N.C. WILD Notebook *by Consie Powell* ©1998 28
Back Porch *by Rodney Foushee* 32
Wildlife Through the Year *by Rodney Foushee* 36

Cover *Mountain creeks are running high this March with promises of great trout fishing. Photograph by Jim Dean.* ©1998

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Stocking the Pantry

written by Jeff Beane ©1998
illustrated by David Williams

Nature isn't always consistent in distributing her bounty. Food is something animals need in relatively constant supply, but changing seasons, weather conditions and other factors make its availability ever uncertain.

Many animals compensate for lean times by storing food when it is plentiful. Having a stocked "pantry" like this eliminates the risk the animal would take if it sought food from uncertain sources, and it also enables its creator, at least theoretically, to hide its location and contents from other animals. Disadvantages include the energy the animal must expend gathering and storing the food, and the risk of spoilage or even theft by other animals. The animal must also remember where the food is stored in order to return and use it (many a mighty oak owes its existence to a forgetful squirrel).

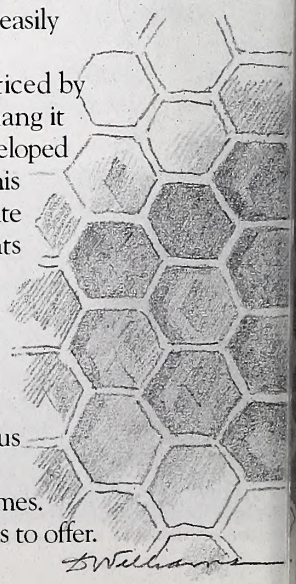
Among mammals, food-storing behavior is best known in rodents. Some, like chipmunks and pocket gophers, have developed special cheek pouches to assist them in gathering and transporting food. Who hasn't seen a squirrel hiding acorns or discovered a mouse's larder under the kitchen sink? But other mammals also store food. Carnivores may eat part of a kill, then cache the remains and return repeatedly to feed on it. Short-tailed shrews may use their toxic saliva to immobilize living prey such as insects, earthworms and snails for short-term storage. Even animals that don't gather food in the conventional sense may store it in the form of fat reserves—groundhogs and bears store enough this way to last them an entire winter.

Birds are not often thought of as food hoarders, but some species are. Jays and red-headed woodpeckers cache acorns, and the acorn woodpecker of the southwestern United States is famous for stuffing acorns into holes it drills in tree trunks. A colony of these woodpeckers may use and defend the same "larder tree" for years. Titmice, chickadees and nuthatches may also cache seeds, but they are more likely to make several small, short-term stashes than a single large one. Even birds that don't hoard their own food may learn to visit repeatedly a continuously available food source, such as a feeder. The yellow-bellied sapsucker creates its own feeding stations by drilling sap wells in tree trunks and returning to feed from them as sap and insects accumulate. Some birds are masters of short-term storage. A pelican's pouched bill really does "hold more than his belly can." Many birds can hold food in their esophagus until it can be fully swallowed, and some have crops—pockets in the esophagus specially modified for storage.

Among reptiles, amphibians and fishes, food hoarding is virtually unknown. This is not surprising considering that many of these "cold-blooded" animals can go for long periods without eating, and that many of them feed only on living prey. But there are always exceptions: Alligators and crocodiles may wedge a carcass too large to swallow under a log or rock and return to feed on it as it decays and softens into more easily bitten-off mouthfuls.

Food storage is not widespread among invertebrates, but it is practiced by some. A spider's web not only catches prey, but provides a place to hang it fresh in a silk wrapping for eating later. Food-storing behavior is well developed in one order of insects—the ants, bees and wasps. Next to man (with his freezers and canned foods), honey bees probably have the most elaborate pantries in all the animal kingdom, constructing special wax compartments for storage of honey and pollen.

Not all animals need to store food. Some eat foods that are always available. Others migrate seasonally to "greener pastures." Still others alter their diet according to what's on the menu. But a chipmunk, finding itself knee-deep in acorns just once a year, has learned to seize its opportunity. The fable of the frivolous grasshopper and the industrious ant is misleading. Grasshoppers aren't really lazy—they work just as hard as ants at what they do, and they don't always die when winter comes. They just use a different strategy for taking advantage of what Nature has to offer.



Other Reading

- "The Cicada Killers," Lawrence S. Earley, *Wildlife in North Carolina* (June 1984).
- "Food and Feeding Habits: Birds that Store Food," in John K. Terres' *The Audubon Society Encyclopedia of North American Birds* (Alfred A. Knopf, 1982).
- "Living with Chipmunks," Rick Estes, *Wildlife in North Carolina* (September 1984).
- Roger Morse, *Bees and Beekeeping* (Cornell University Press, 1975).
- "A Queendom of Bees," Curtis Wooten, *Wildlife in North Carolina* (April 1982).

Surfing the Web

- "The Squirrel Almanac" home page contains general information on North American tree squirrels. *Address:* http://spot.colorado.edu/~halloran/sqrl.html

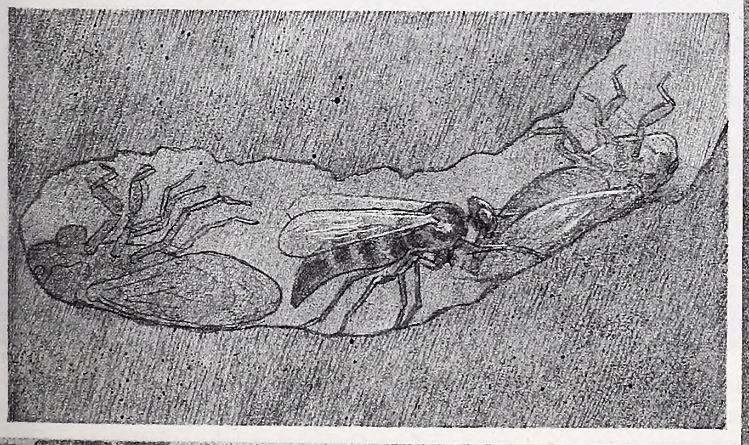
Fascinating Facts

- Chipmunks' oversized cheek pouches are large enough to carry several nuts at a time.
- Chipmunk burrows can be as much as 12 feet long, with several entrances.
- Baby chipmunks are called pups.

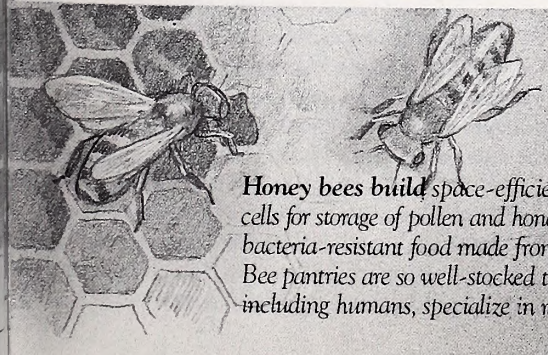
Chipmunks, gray squirrels *and woodchucks are all squirrels with different food-storing strategies. Chipmunks stockpile food in their burrows, stirring from their sleep occasionally to feed on their stores. Gray squirrels forage all winter for nuts they buried during the fall. Woodchucks store food as body fat, entering torpor in winter and living off their fat reserves.*

The blue jay is *one of many birds known to store food. It may cache nuts in a tree hollow or push them into the ground.*

The cicada-killer, *a solitary wasp, stores food for her offspring, but not for herself. She stings a cicada, drags it down a burrow she has dug and lays an egg. The growing larva feeds on the live but paralyzed cicada.*



An orb weaver's web *not only traps food, but serves as a convenient larder where insects are hung in silk packages to be eaten at the spider's leisure.*



Honey bees build *space-efficient, hexagonal cells for storage of pollen and honey—long-lasting, bacteria-resistant food made from modified nectar. Bee pantries are so well-stocked that many animals, including humans, specialize in robbing them.*

Bald Eagle on the Comeback Trail

Virtually eradicated in North Carolina nearly three decades ago, the bald eagle has made a slow but steady rebound, with a little help from some friends.

written by Rodney Foushee

Carol was first to spot it. My inexperienced eyes quickly followed her outstretched arm up the huge loblolly pine, and then I too saw the white head of the adult bird. It was my first glimpse of a wild bald eagle. The size of the raptor atop its massive nest instantly grabbed my attention, even from several hundred feet away. But it was her eyes that held me. The intense unwavering spheres of the female eagle pierced through the still pine woods. I realized that there are few creatures that can stare down an adult bald eagle or sneak up on one.

The mother eagle, of course, knew we were there all along. She had been following our approach long before we dared peek up through the forest canopy overlooking Jordan Lake to spy on her bulging nest of branches and twigs. Amid the fallen pine needles on the forest floor were the bones of myriad fish and hapless turtles that had fed the young eagles over the past few years. The Chatham County nesting site, discovered in 1991, was the first eagle nest documented in Piedmont North Carolina in decades.

We slowly moved closer, picking our way through the thorny briers and taking up a position in the boughs of a fallen pine. The downed tree created a natural opening in the forest, which provided an unobstructed view of the eagle's nest.

LEONARD LEE RUE JR.

With its majestic flight *and keen eyes, the bald eagle has inspired humans for thousands of years. Once common in North Carolina, the powerful bird was wiped out here in the early 1970s by the use of the pesticide DDT. Efforts by the N.C. Wildlife Resources Commission and others have helped to restore the bald eagle.*

"We should be able to get a good shot of the young eagle from here," Carol Banaitis whispered. "If it hasn't left the nest already," she added. A forester with the U.S. Army Corps of Engineers, she has been working with bald eagles since 1989. A black rat snake reluctantly gave up its hiding spot beneath the dead limbs and slithered away at our feet as we carefully unfolded the camera's tripod and set up the equipment.

It was mid-June last year, and an unusually cool spring had set nature back just enough to provide us with a spectacle few have had the opportunity to witness. The mottled fledgling, nearly as large as the adult eagle, rose on cue from the bowels of the nest and began squealing rhythmically and flapping its huge, untested wings. The mother eagle, realizing we posed no real threat, turned away from us and continued her flight lessons with the youngster.

The fledgling's squeals and flapping grew in intensity as the white-headed adult took to the air directly over our heads. Her huge outspread wings beat slowly with the sound of deep breaths as the female bald eagle labored to gain altitude. She landed in a snag 100 yards behind us and began calling to the young bird, coaxing it to follow. The eaglet frantically flapped its wings and rose from the nest ever so slightly, only

LEONARD LEE RUE III

***Despite being designated** the national symbol in 1782, the bald eagle has been mistrusted and persecuted for most of the past 200 years. Though its large size, powerful talons and beak make it a formidable predator, the bald eagle prefers a diet of sick and dead fish.*

to fall back down again. Despite the mother's powerful urging, the young bird was unwilling to take the leap of faith. After about 10 minutes the adult bird departed, perhaps to join its mate in search of food for the nest-bound youth.

Here near the heart of the bustling Research Triangle, we were witnessing one of the last vestiges of the American wilderness. The bald eagle, more perhaps than any other bird, conjures up emotions in Americans—freedom, strength, wildness. But the bald eagle is also a symbol of our disregard for the environment, our destruction of the natural world.

Despite being designated the national symbol in 1782, the once-common bald eagle has been persecuted, shot, poisoned and robbed of its nesting habitat by Americans for most of the past 200 years. Victims of the insidious man-made pesticide DDT, bald eagles were threatened with extinction across much of the United States during the 1970s. Only in recent years has the tide finally shifted in favor of the bird's recovery.

Nowhere is its road to recovery more evident than in North Carolina, where just 20 years ago it was impossible to find a single bald eagle nesting anywhere in the state, let alone 30 minutes from downtown Raleigh. Today, as a testament to the success of wildlife management and endangered species protection, there are 19 occupied bald eagle nesting territories spread across 13 North Carolina counties. And last spring, a record number of young eagles made their first flights in Tar Heel skies.

The Demise of the Eagle

When the first permanent European settlers arrived in the 1600s, the bald eagle (*Haliaeetus leucocephalus*) and its massive nest were common sights in eastern North Carolina. It's likely that nearly every mile of the state's coastal sounds and rivers, with their rich fisheries and waterfowl resources, supported a bald eagle nest.

Bald eagles tolerated humans for thousands of years. Nearly every Native American tribe respected the eagle, and many worshiped it as a messenger between the heavens and the earth. Though Native Americans hunted eagles for their feathers and other body parts for religious purposes, it is unlikely that their limited weapons had much of an impact on eagle populations.

But when Europeans arrived, many brought with them a very different opinion of the powerful white-headed hunter. Like wolves, cougars and other large predators, bald eagles were viewed as threats by pioneers and acquired a nasty, if unfounded, reputation for plundering fish, wildlife, livestock and even unattended babies. "He [the bald eagle] is an excellent Artist at stealing young Pigs, which Prey he carries alive to his Nest, at which time the poor Pig makes such a Noise over Head, that Strangers that have heard them cry, and not seen the Bird and his Prey, have thought there were Flying Sows and Pigs in that Country," wrote naturalist John Lawson in his *A New Voyage to Carolina*, published in 1709.

With such low opinions of eagles, pioneers readily shot the majestic birds, and a general mistrust of eagles continued well into this century. Several states even offered bounties for dead eagles. Less obvious, but perhaps more damaging in the long run, bald eagle nesting habitat was destroyed and damaged over centuries as homesteaders and loggers systematically cleared forests for settlements and timber. In North Carolina, most of the old-growth forests have been cleared or altered. Bald eagles require these large, old trees, not only to support their massive nests but also for perching and roosting. An accelerated clearing of forests in this century and the conversion of many areas to agriculture and young, fast-growing tree farms have destroyed much of the bald eagle nesting habitat in eastern North America.

With nesting habitat shrinking, bald eagles were also driven from many of their traditional haunts by human activity. A bird that prefers solitude, the bald eagle will readily abandon a nesting area regularly disturbed by humans. Even logging activity or the presence of new roads can disrupt nesting and reduce reproductive success.

Despite outright killing, habitat destruction and encroachment by humans, the bald eagle was still considered fairly common in North Carolina as late as 1940, when the Bald Eagle Protection Act was passed. But bald eagle populations in North Carolina, like those across much of the continental United States, had already begun to decline and would plummet after World War II with the widespread use of DDT and other man-made pesticides.

These insidious chemicals—intended to control insects on farm and forest lands—washed into streams and lakes, where they were absorbed by aquatic plants and worked their way up into the food chain, becoming concentrated in fish, which were then eaten by bald eagles. DDT interfered with the bird's production of calcium, resulting in thin eggs that often broke under the weight of the adult during incubation. Though many species were affected by DDT, none were harder hit than fish-eating predatory birds, including the bald eagle, osprey and brown pelican.

Wildlife biologists estimate there may have been as many as 75,000 nesting bald eagles in the continental United States at the end of the 18th century. By the early 1960s, with the effects of DDT fully realized, there were fewer than 450 nesting pairs. And by 1968, only one bald eagle pair successfully bred in North Carolina.

While remnant populations survived in neighboring Virginia and South Carolina, the national bird was, in effect, extirpated from North Carolina in the early 1970s when all nesting success ceased in the state. Despite protection from the newly enacted Endangered Species Act and the banning of DDT in 1972, it would be another 12 years before a bald eagle successfully nested again in the Tar Heel State.

The Road to Recovery

When you have no eagles left, it's tough to bring them back. This was the hard lesson taught by the Endangered Species Act and brought home to frustrated biologists in North Carolina and other states that lost their entire eagle populations to DDT. The problem was compounded by the eagle's innate sense to nest as an adult close to where it learned to fly as a youth and the long time it takes the birds to mature—about five years.

"You can't force adult eagles to build a nest anywhere you like and start a population," explains David Allen, the biologist who supervises the N.C. Wildlife Resources Commission's Bald Eagle Monitoring Program. "With all our North Carolina bald eagles wiped out by DDT, we were way behind other states where the birds held on."

In 1980, biologists were hopeful that natural eagle repopulation could occur when they discovered a single bald eagle nest on the Outer Banks in Dare County. Although an egg was laid, it failed to hatch,

The "American" Eagle

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

The bald eagle—the only eagle unique to North America—historically was common throughout much of the continent. A member of the sea eagle family, the bald eagle prefers to hunt and build its nest near large bodies of water, including coastal sounds, marshes, rivers and lakes. Though eagles occasionally stray as far inland as the Mountains during migrations, their historic nesting range in North Carolina is east of the fall line, which separates the Piedmont from the Coastal Plain. The creation of large man-made lakes and the rich fisheries these reservoirs support has helped the birds expand their nesting into the Piedmont in recent years. Bald eagles will feed on almost anything they can catch, including waterfowl, small mammals and carrion, but the staple of their diets is fish. They typically feed on sick and dead fish and animals and pose little threat to healthy prey populations. Bald eagles are often found in the same general habitat as the osprey (*Pandion haliaetus*) and are skilled at stealing fish from the more nimble fish hawk.

Bald eagles are huge—male bald eagles usually measure 3 feet from head to tail and weigh from 7 to 10 pounds, and have a wingspan of about 6 1/2 feet. Females are larger, with some reaching 14 pounds and having a wingspan of up to 8 feet. Young eagles are mottled brown and are often confused with golden eagles. The distinctive white head and tail feathers of the adults appear only after the bird is 4 to 5 years old.

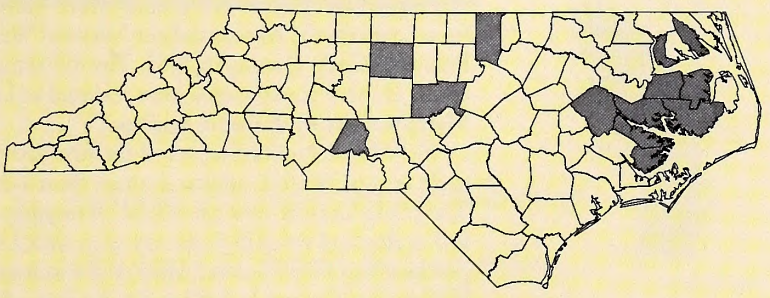
Bald eagles can live 30 years in the wild, and even longer in captivity. They mate for life and build the largest nest of any North American bird. Bald eagles choose large, solitary trees to support their nests. In North Carolina, nests are generally built in tall pine or bald cypress trees that tower above the surrounding forest. With additions made to the same structure annually, some nests can reach 10 feet across and weigh up to a ton. Although bald eagles may range over great distances in search of food and to escape extreme weather conditions, they usually return to nest within 100 miles of where they were born.

In North Carolina, eagle pairs return to the nesting site in November and continue courtship and nest-building activities through early winter. Egg laying usually begins in February, when the female lays two to three eggs. The eggs hatch after about 35 days. The young eagles are usually flying within three months and are on their own about a month later.

In winter, northern birds migrate south and gather in large numbers over open water where fish are abundant. Southern bald eagles follow a different tactic and migrate north from Florida during the late summer to avoid the extreme heat. North Carolina hosts both eagle races, with the northern eagles breeding here and southern eagles gathering in huge feeding flocks over interior lakes during the late summer. For a good view of bald eagles, check out the Wildlife Commission's eagle observation deck overlooking Jordan Lake off N.C. 751 between May and August.

To reach the deck, take exit 274 off Interstate 40 east of Chapel Hill. Drive south on N.C. 751 about five miles and look for the marked parking lot turnoff. Follow the marked trail about 0.7 miles to the observation deck.

Counties with Active Bald Eagle Nests



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JACK DERMID

***A lone adult** bald eagle (above) eyes a pair of swans from its perch in a bald cypress on Lake Mattamuskeet. The bird is possibly one of several young eagles released by wildlife biologists at the Hyde County lake (facing page) in the early 1980s.*

and the adult eagles never returned. Encouraged by this discovery and sure there was sufficient breeding habitat in northeastern North Carolina, the Wildlife Commission, in cooperation with the U.S. Fish and Wildlife Service, began reintroducing, or "hacking," young bald eagles to give Mother Nature a boost.

Eaglets, taken from their nests in northern Wisconsin, were raised in captivity with as little human contact as possible and then brought to North Carolina for release. Four of these birds were "hacked" from cages on the Mattamuskeet National Wildlife Refuge in Hyde County in 1983. The following five years, 25 more young eagles were released at Lake Mattamuskeet in the same manner.

In 1984, biologists discovered the first active bald eagle nest in North Carolina in more than a decade. The Hyde County nest produced two eaglets that first spring and was still active last year, with 13 young produced so far. A second eagle nest was found in Washington County in 1985 and a third was discovered in Beaufort County in 1988—about the time the first-released birds would have matured.

At the same time, large flocks of migrating bald eagles began showing up around the newly constructed Jordan Lake and other Piedmont reservoirs during the summer. Biologists believe these birds are southern eagles that are escaping the Florida heat after a successful breeding season.

Once those initial nests were discovered, the Wildlife Commission began monitoring annual bald eagle nesting each spring using an airplane and a team of volunteers on the ground. Since 1990, 16 new eagle nests have been discovered in North Carolina, and the number of young eagles being produced keeps growing. While most of the nests are near the coast, several of the new nests are located in the Piedmont—near Raleigh, Greensboro and Charlotte, far from the bird's historic nesting range. Large, man-made lakes have created prime nesting and foraging areas for bald eagles that have offset some of the lost coastal habitat.

With much of the remaining bald eagle nesting habitat located on government land, state and federal biologists have seized the opportunity to manage the landscape for eagles.

"To encourage good eagle habitat, we thin out a stand of mature pines to leave a few well-spaced large trees for roosting and nesting," explains Banaitis, the Army Corps of Engineers forester who helps manage land around Jordan and Falls lakes. So far, three bald eagle pairs have established nests near the lakes.

"We also close off the area around eagle nesting trees to the public to reduce the stress on the birds," Banaitis said. These posted eagle recovery areas are typically closed to the public from January through June. It is illegal to disturb nesting bald eagles.

These management efforts seem to be paying off in North Carolina and elsewhere. The year 1997 proved a banner one for bald eagles in the Tar Heel State with 14 nests active and 26 young eagles produced —double the previous record of 13 set in 1995.

Though still not completely recovered, the bald

WILLIAM S. LEA

WILLIAM S. LEA

MICHAEL F. OVERTON

***Thanks to the success** of wildlife management, bald eagles (top right) are once again nesting and producing young in North Carolina. Their massive nests (above), which can weigh up to a ton, are now found in 13 counties from the Tar Heel coast well into the Piedmont.*

eagle was "downlisted" from "endangered" to "threatened" by the U.S. Fish and Wildlife Service in the lower 48 states in July 1995. There is still plenty more room for recovery in North Carolina.

"This increase can go much further," Allen said. "There are places in South Carolina and Florida where a pair of eagles can be found along every mile of shoreline with good foraging habitat. We are nowhere near saturation in North Carolina. With our good habitat and rich estuaries, we can support many more eagles."

Allen is working with biologists from other states and the Fish and Wildlife Service to rewrite the bald eagle management plan for the Southeast. With the help of dedicated biologists, volunteers and sound habitat protection, it is possible that the national bird can be completely removed from the endangered species list by the turn of the century.

But the threats to bald eagles from human disturbance and destruction of wetlands and forests are still a real concern. Unfortunately, both eagles and humans put a premium on waterfront property. And in the past, the eagles have lost.

Only time will tell if we are able to set aside enough wild space to ensure that the young bald eagles born this spring in North Carolina will have a place in the future to raise their young. The valiant recovery so far breeds hope for both humans and eagles. ⊠

LEONARD LEE RUE JR.

The bald eagle, more than perhaps any other bird, conjures up emotions in Americans—freedom, strength, wildness. But the bald eagle is also a symbol of our disregard for the environment, our destruction of the natural world.

Flies & First-Day Trout

Bad weather, crowds and high water are what you can expect on a typical Opening Day. Bet you can't wait!

written and photographed by Jim Dean ©1998

In a sane world, the first legal day of trout fishing would take place each year about the first week in May when the weather is balmy. You would have a long stretch of stream to yourself, the water would be at normal levels and clear, and the trout would be slurping hatching flies as if they were hot doughnuts on a Krispy Kreme conveyor.

But sanity and trout fishing are mutually exclusive concepts, and nowhere is that better demonstrated than on that first Saturday in April we fondly call Opening Day. The weather is more likely to be miserable, the water is often treacherously high, frigid and murky. Worse yet, every accessible stretch of stream is packed with fishermen convinced that they are having great fun. The tired joke is that you have to bring your own rock to stand on. Yet, no matter how forlorn the outlook, there are always fishermen who manage to catch trout, even on artificial flies.

Before he died a few years ago, A.J. Johnson hosted his old friends at his mountain cabin each Opening Day to celebrate the end of winter. I was in my 20s when I was invited to become a part of this annual group, and fly fishing for trout was relatively new to me. When everyone finished fishing that first day, we gathered back at the cabin to see who had caught what. Those who wanted trout for supper had kept a few.

"Well, how'd you do, young fellow?" Johnson asked me as he slipped off his vest.

"I didn't catch anything," I said. Then I naively made the mistake of adding one of those silly, elitist remarks typical of inexperienced fly fishermen. "But, of course, I would rather fish with a fly rod, even if I don't catch anything," I sniffed.

Johnson snorted, then laughed. "Yeah, well there's no law that says you have to choose one or the other." Then he reached in his vest and pulled out a pair of trout that dwarfed the others in the sink. He'd caught

***The opening day of** trout season can be maddening for some, but fine fish like this brown trout can be taken by the angler who avoids the crowds and uses the proper fly presentation. One of the most effective early-season "search" tactics is to use the two-fly tandem rig developed by the late A.J. Johnson. The weighted nymph will usually attract most of the strikes, but the dry fly will also take fish on sunny days.*

them on flies. "Tell you what," he said, draping a lanky arm over my shoulder. "You go with me tomorrow, and we'll see if we can't put you on some decent trout."

I did, and he did. Although much of what I learned from Johnson in the years that followed applies throughout the season, some of his tips are particularly appropriate for early-season fishing. Here are the best of them:

Be First on the Water

***Joe McDade lands** a nice brown trout that he hooked on a large, weighted stonefly nymph. Early in the season when streams are running high and the water is dingy, weighted nymphs are a good choice.*

Wild trout in Southern Appalachian freestone streams do not play by the same rules as trout elsewhere. Most of our streams are so nutrient poor that aquatic insect hatches tend to be sparse. The trout must become opportunists, eating just about anything and everything they can find just to survive, and since they have less opportunity to become engrossed in feeding selectively on one particular species of mayfly or other aquatic or terrestrial insect, they are much more easily spooked than trout in streams with abundant insect life. The fact that our streams are also typically small and very clear enhances this characteristic.

Wild trout in our waters, particularly browns, must be the wariest critters on the planet. Give them the slightest notion that you're around—a glimpse of movement, a spreading ripple as you wade, an incautious footstep, even your fly line in the air—and they scoot under the nearest rock in terror. Furthermore, they may stay there for hours and sometimes won't re-emerge to feed again that day. Worst of all, if you spook one fish in the tail of a pool, it will run upstream screaming bloody murder and scare every other trout in the pool.

That means if you aren't the first fisherman to fish a stretch of water on any given day, your chance of catching more than a few small trout is minimal. If you're third in line, forget it.

Early in the season, and particularly on Opening Day, it will pay to get on the water as soon after daylight as possible. Yes, trout do tend to feed better through midday, but if you don't have a secret spot no one else knows about, you'd best not wait. I've had some astonishing success at first light even in poor weather. Of all Johnson's rules, being first on the water is the most important.

Pick Your Own Opening Day

This is a variation on the first rule. Since many streams are open year-round, you can sometimes avoid big crowds by scheduling your "Opening Day" a week earlier, or by waiting a week. Even going a day early or late can help. One of the biggest trout I ever caught was taken on a Friday before the traditional Saturday opener. The season was open on that stream, but the crowds were still traveling or pitching tents. That trout most likely hadn't seen a fisherman in weeks. Even waiting until Sunday may help if you get out early in the morning, because there are almost always fewer anglers the second day.

Fish the Smaller Headwaters

Go high, Johnson used to say. That meant we avoided the accessible main stems of creeks and instead hiked into the smaller headwater tributaries that typically get less pressure. Of course, you have to know an area thoroughly to do this successfully, because there may not even be a trail to the spot you fish. Still, you may be astonished at both the numbers and size of wild trout in these tiny headwaters. Even on the bigger water, if the stream split for a few hundred yards, Johnson would always fish the smaller side, because everyone else usually fished the main stem.

Stay on the Move and Stay Hidden

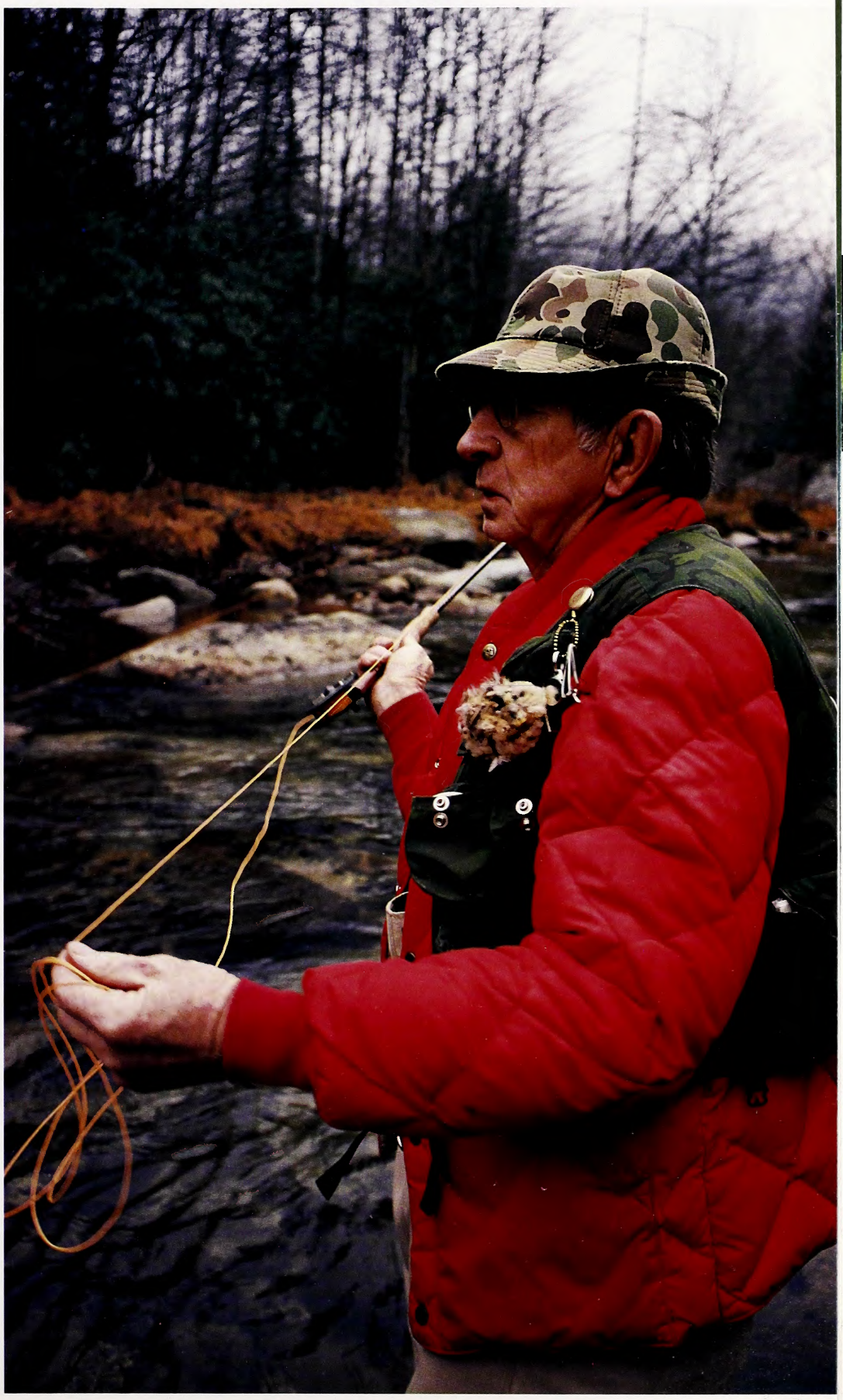
One of the biggest mistakes newcomers to trout fishing make is fishing too slowly. Most books about tactics are geared toward trout fishing in the larger, far richer streams of the Northeast or West, where heavy hatches and selective trout sometimes make it possible to spend the whole day fishing a few big pools. That seldom works here. If the water is clear, and you take care to stay hidden, you might get in two or three casts on a big pool before the trout run, but if you don't catch a fish right away, it's best to move on. Most experienced southern fly fishermen hardly bother with those inviting pools unless the water is high and dingy. Then, it's sometimes possible to fish big, weighted nymphs deep with some success, but it still doesn't pay to linger.

Instead, concentrate on the swifter pocket water and runs where you're less likely to be seen, and keep moving, making no more than two or three casts to each likely spot. You'll cover more water—perhaps a mile or two—but you'll also catch more trout.

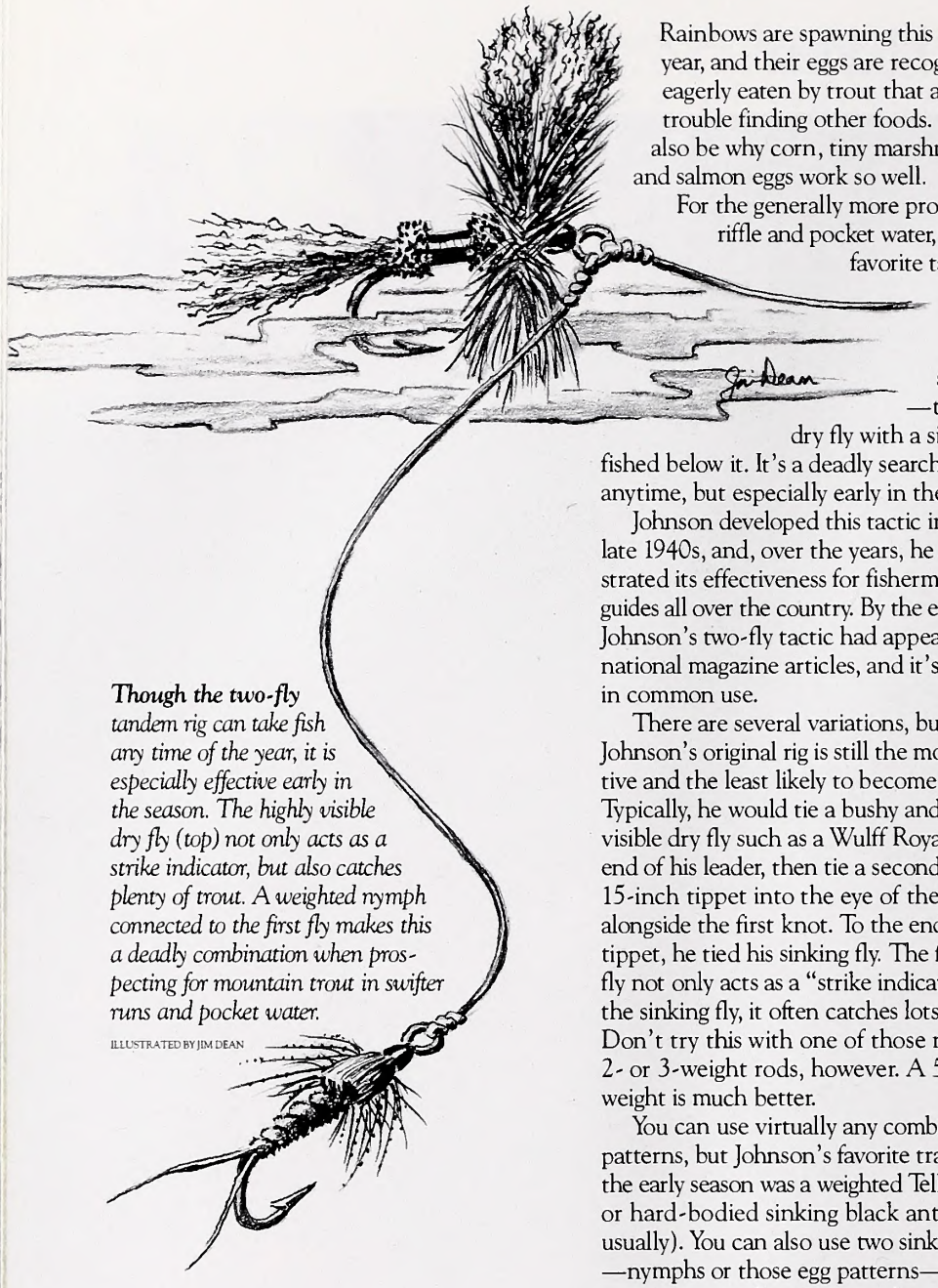
Johnson also liked to stay out of the water as much as possible. He preferred to creep along the bank and fish from behind rocks, planning each approach and making the first cast count. It's also a good idea to wear dull-colored clothing or camouflage. Red shirts are for photos; white shirts are for church.

Two Flies Are Often Better Than One

Early in the season, it's harder to predict how trout will feed. On warmer days, they may take dry flies, but more often, they eat their meals beneath the surface. You can sometimes dredge trout out of deep pools with weighted nymphs and streamers if the water's dingy enough to help hide you, but in more recent years, I've decided that those puffy, clipped yarn flies that imitate trout or salmon eggs—fished singularly or in tandem—are more deadly early in the season. Since they can't be easily tied with internal weight, a couple of split shot clamped to the leader above the fly will help you fish deep enough.



A master angler, *A.J. Johnson didn't let frigid weather or high water keep him from his favorite trout stream on Opening Day. Decades of experience taught Johnson he could catch trout on flies most of the time as long as he was the first on the water and avoided the crowds.*



***Though the two-fly** tandem rig can take fish any time of the year, it is especially effective early in the season. The highly visible dry fly (top) not only acts as a strike indicator, but also catches plenty of trout. A weighted nymph connected to the first fly makes this a deadly combination when prospecting for mountain trout in swifter runs and pocket water.*

ILLUSTRATED BY JIM DEAN

Rainbows are spawning this time of year, and their eggs are recognized and eagerly eaten by trout that are having trouble finding other foods. That may also be why corn, tiny marshmallows and salmon eggs work so well.

For the generally more productive riffle and pocket water, Johnson's favorite tactic was to use two flies at the same time—typically a dry fly with a sinking fly fished below it. It's a deadly search tactic anytime, but especially early in the season.

Johnson developed this tactic in the late 1940s, and, over the years, he demonstrated its effectiveness for fishermen and guides all over the country. By the early 1980s, Johnson's two-fly tactic had appeared in national magazine articles, and it's now in common use.

There are several variations, but I think Johnson's original rig is still the most effective and the least likely to become tangled. Typically, he would tie a bushy and highly visible dry fly such as a Wulff Royal on the end of his leader, then tie a second 12- to 15-inch tippet into the eye of the hook alongside the first knot. To the end of this tippet, he tied his sinking fly. The floating fly not only acts as a "strike indicator" for the sinking fly, it often catches lots of trout. Don't try this with one of those noodly 2- or 3-weight rods, however. A 5 or 6 weight is much better.

You can use virtually any combination of patterns, but Johnson's favorite trailing fly in the early season was a weighted Tellico nymph or hard-bodied sinking black ant (size 12 usually). You can also use two sinking flies—nymphs or those egg patterns—but what you tie on your line isn't nearly as important as how you fish it. To help prevent tangles, be sure to tie the heavier fly on the trailing leader and don't rush your back cast. You'll get the hang of it pretty quickly.

On High Water, Fish the Edges

High water is common early in the season, and it throws some anglers for a loop. One day nearly 20 years ago, a two-day rain pushed our favorite trout stream out of its banks. In front of Johnson's cabin, the swift current spread through the woods and backed up into the road.

"How can trout survive in that torrent?" I asked.

"They're not in the main current," he replied. "They're in the woods."

Though I was dubious, Johnson took a small spinning rod and walked down to the edge of the water. He cast across the current, then waited until the spinner swung back into the quiet eddies well outside the normal channel. To my surprise, he caught several wild browns along the edge, one of them practically in the road.

"When water rises, the trout rise with it, staying along the edge and feeding on insects, worms and other terrestrial foods uncovered by the flood," he said. "They have better sense than to fight all that current when there's a buffet being served next door."

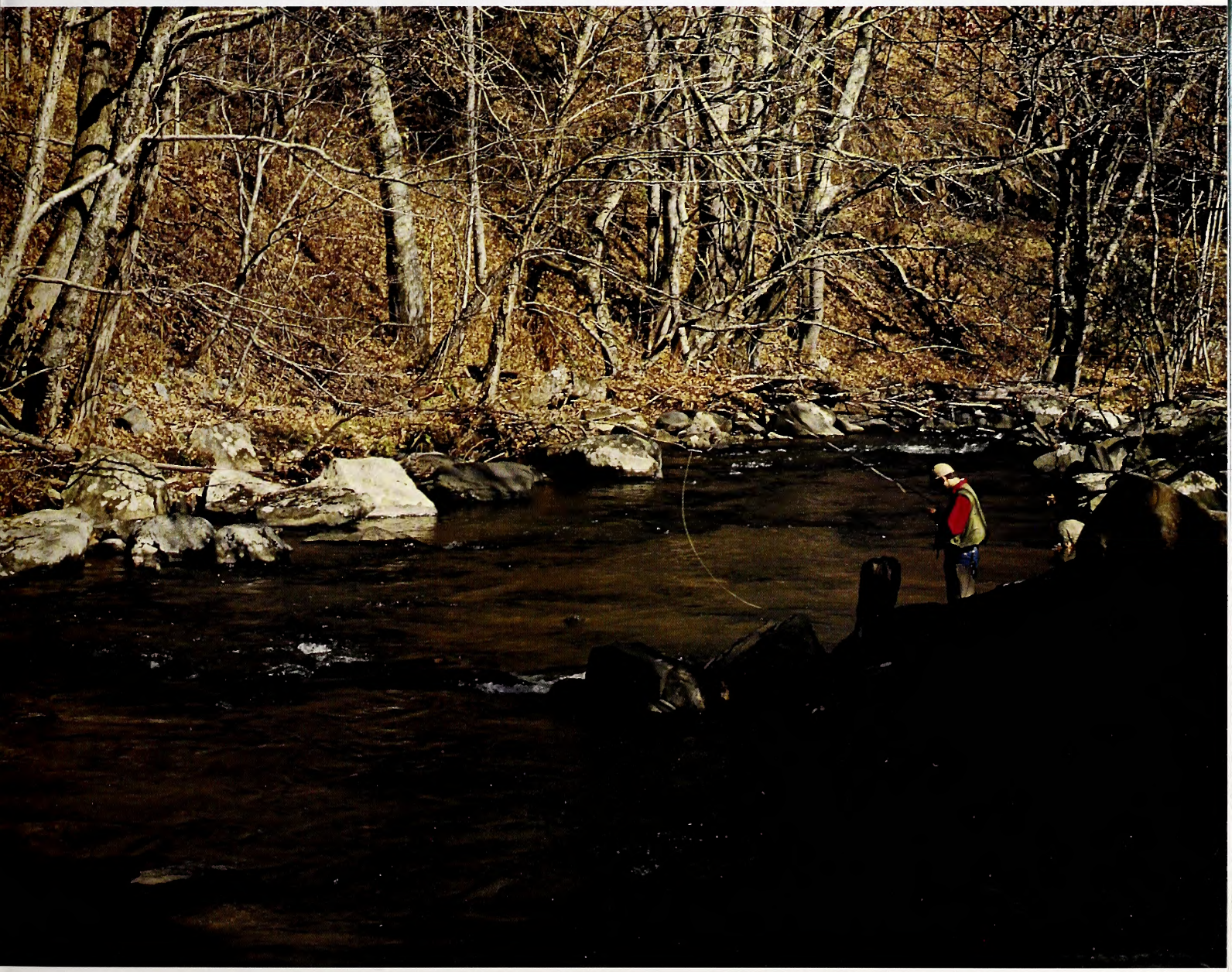
It was an important lesson, and it means that you can't afford to neglect the eddies and side currents on high water. It's a tactic that works best in warmer weather, but if the water is high on Opening Day, it's worth a try.

Sometimes You Just Get Lucky

If you stay at it long enough, an Opening Day will roll around that makes all of those frigid, fishless openers worthwhile. In 1978, after a very cold winter, the temperature on that magic April day topped out at 85 degrees. Three of us split up and caught trout all day on dry flies, then we stripped off our clothes and jumped into the 50-degree water to celebrate.

You don't need sophisticated tactics on such days. You just have to be lucky enough to be there. ⊠

A brightly colored, *clipped yarn fly (right) imitating a trout egg is an effective early-season fly. Another favorite is a weighted nymph, being tried by Scott Dean (below).*



You've got the painkillers and the sterile bandages, the splints and the Ace wraps. But before you pick up your backpack, take a moment to consider...

the Firstest Aid of All

written by Burt Kornegay ©1998
illustrated by Chris Armstrong ©1998

Let's say you're packing for a hike on the Appalachian Trail, and you remember that, along with rain gear, food and a tent, you ought to put some type of first-aid kit in your backpack. Since you could fill your pack with the first-aid items for sale at the local pharmacy—from half a dozen types of snakebite kits to 50 brands of painkillers—some sort of selection is necessary. So, what should the kit contain?

One way to answer this question is to ask another: Besides the usual blisters, scratches and bee stings common to campers, how are you most likely to get hurt on the trail? If you aren't sure about the answer, let me tell you. You are most likely either to get cut or to strain a muscle, sprain a joint or break a bone. Such "soft tissue" and "musculoskeletal" injuries, as they are called by rescuers trained in emergency wilderness care, make

up the majority of injuries suffered by outdoor enthusiasts, from backpackers and mountain bikers to hunters and fishermen. So, the answer to the question about the first-aid kit logically follows. The kit should contain chiefly the items needed to dress wounds and to immobilize bones or joints. We're talking about Band-Aids, sterile dressings and roller gauze, Ace wraps, SAM Splints, and triangular bandages.

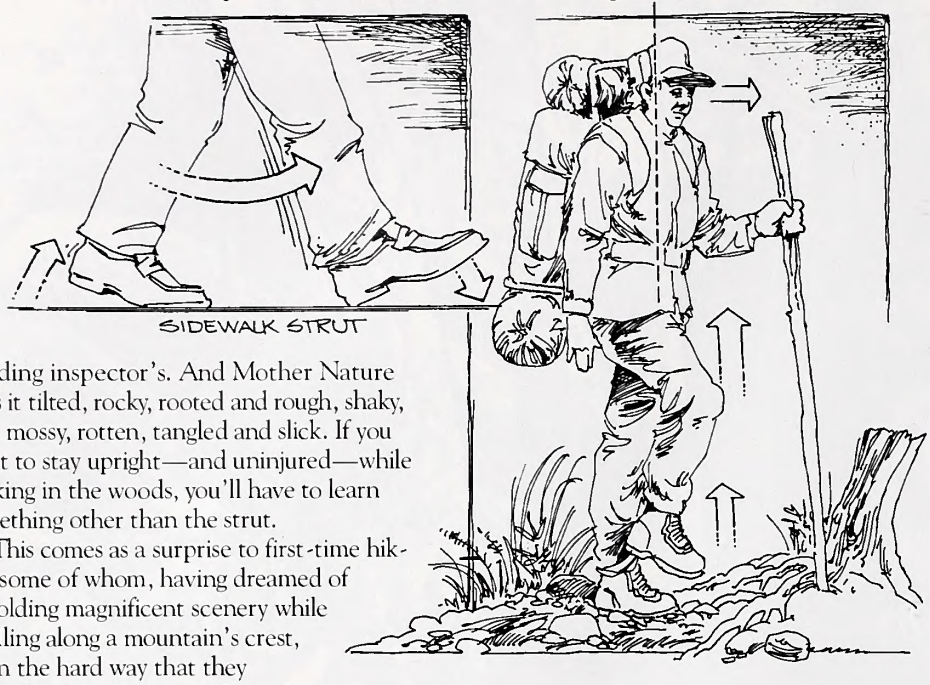
In addition to deciding what medical supplies to carry, there is another question you ought to ask yourself before hitting the trail, a question that moves us from the topic of first aid to one that I think of as the "firstest" aid of all: "How can I keep from cutting my flesh or breaking a bone to start with?" Luckily, this question about the prevention of injuries also has a clear-cut answer: stay upright and on your feet because tumbles—off a slick rock, down a steep slope, over an exposed root or a fallen log—are the chief causes of the most common and most painful injuries.

Since falls cause so many of the injuries suffered by hikers, I often begin a Slickrock Expedition by giving participants a few tips about how to walk in the woods. You may scoff, "What's to learn? I've been walking all my life!" But the relevant question is this: How much time have you spent walking *in the woods?*

The question is relevant because almost all of the walking we do takes place not in wild country but in an urban environment, where the surfaces are smoothed and leveled for the unconscious, unimpeded movement of our feet. This includes the floors of the houses, offices, factories, stores and classrooms where we live and work, as well as our lawns and driveways, sidewalks and streets, ball fields and tennis courts. And because most of our walking takes place in this kind of environment, we grow up learning a gait that is suited to it, but not to the woods. It's a manner of walking I call the "sidewalk strut," and here is how it goes. We push off from the ball of the back foot, swing the foot forward, toes pointing out, and land, lock-kneed, on the heel. Then we push off from the ball of the other foot. Analyzing this pace almost a hundred years ago, Horace Kephart concluded in *Camping and Woodcraft:* "This is an ill-poised gait, because one's weight falls first upon the heel alone, and at that instant the walker has little command of his balance."

On a smooth surface, strutting works. We push off and fall forward, push off and fall forward, making quick time down the hallway or city block. But the forest floor has been built to Mother Nature's specs—not to the

Walk like an Indian



building inspector's. And Mother Nature likes it tilted, rocky, rooted and rough, shaky, wet, mossy, rotten, tangled and slick. If you want to stay upright—and uninjured—while walking in the woods, you'll have to learn something other than the strut.

This comes as a surprise to first-time hikers, some of whom, having dreamed of beholding magnificent scenery while strolling along a mountain's crest, learn the hard way that they cannot even make it upright *to* the mountain! I recall watching a novice backpacker at a trailhead 10 years ago sling on his pack and, at a fast strut, start across the graveled parking lot toward the Nantahala National Forest. He saw the dark-green mountains rising in front of him, threw out his arms and exclaimed, "This is great!" Then he tripped and fell flat on his face. He lay there in the gravel a moment, stunned by his fall. With arms and legs splayed out from beneath his pack, he looked like some long-legged turtle with a blue shell on its back.

In contrast, I think back now to an instructive afternoon 20 years ago when I stood on the bank of the Rogue River, in Oregon, and watched a black bear walk along the rocky bank opposite me. Where even the best of hikers would have been put to it, the bear moved along relaxed, pausing occasionally to smell the air or to glance across the river at me. How did he travel so surefootedly along that steep, bushy bank?

The answer was plain to see. At least two of his feet were always in contact with the ground; his center of gravity was low; his supple, muscular torso, his neck and head were parallel to the ground and lined up behind a brush-parting snout; and his clawed, pliant and padded feet, with every step, molded themselves to and gripped the rocks. Compare the soles of his feet to your stiff Vibram boot soles! Furthermore, Bruin carried his "tent" and "sleeping bag" wrapped around him in the form of a thick fur coat, and he packed his "trail food" in an encircling layer of fat. But the backpack that a hiker stuffs with all manner of food and gear, then slings up onto his shoulders, alters his center of gravity and upsets his sense of balance.

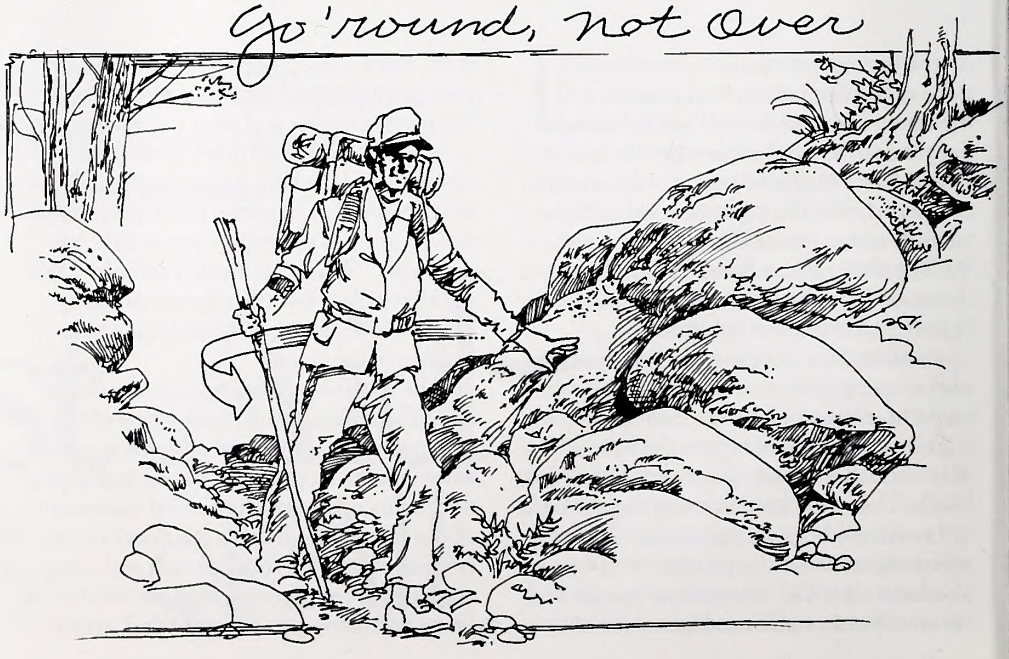
How *should* we walk in the woods? To begin developing a feel for proper woodland walking, I suggest you go outside, choose a goal that's 100 yards away, and spend a thoughtful 20 minutes walking toward it. Yes, I said 20 minutes—about the time you could strut a mile. Obviously, you'll have to put the brakes on your accustomed rate of speed. As you move forward slowly, conjure up the image of an Appalachian clogger and imitate his stance by maintaining good back posture, letting your arms hang at your sides, loosening up your hips, and flexing your knees. Keep that heavy part of your body, your head, upright and pointed forward, centered over your shoulders. If you must look down, do so with your eyes only, not by tilting your head. When you take a step, instead of pushing off from the ball of your foot, lift your leg from the hip; and then, in a controlled way, set your foot down straight in front of you, either flat or with the ball of the foot touching the ground first—like a clogger. Once the foot is planted, slowly transfer your weight to it and begin the next step in the same slow-motion way.

Such a gait will seem awkward, tiring at first, just as clogging does. And I am not suggesting you hike like this for long distances. But you will grow accustomed to the pace with practice, and a few sessions of such concentrated movement will stick the following three points in your mind. First, walk with slightly bent knees—knees that "'give' at every step," as Kephart put it. Second, lift your leg. Third, plant your foot —not just your heel—in front of you. These are the ambulatory ingredients of the "peculiar, elastic, noiseless and stealthy tread" that Thoreau observed admiringly in the Indians who served as his Maine guides. And you can successfully combine them into an "elastic," surefooted tread of your own.

Besides forgoing the sidewalk strut for the woodland walk, you can do two other things to avoid falls. First, get into the habit of going around or—if they are small—of stepping over logs, rocks, branches and roots in the trail. Do not—as many hikers do—step up on such obstructions. Writing in 1709, the North Carolina explorer John Lawson tells us this is how the Indians traveled: "neither will they stride over a Tree that lies cross the Path, but always go round it."

Second, use a hiking stick. By hiking stick

Go 'round, not over



I mean a shoulder-high staff, not a waist-high cane. Using a cane will force you to bend over awkwardly at precisely those times when you most need good upright posture—when descending steep pitches or when stepping from rock to rock across a creek or a boulder patch. On difficult terrain a hiking stick will transform you from an unsteady two-legged creature into a confident three-legged one. Also, a hiking stick will be indispensable when you encounter one of the most common obstacles to wilderness travel—creeks that must be forded. Swift mountain creeks, in particular, push powerfully against the legs; and their slick, algae-coated rocks offer no traction for the feet. If you try to walk across such a creek the way you'd cross a road, you'll have your feet swept downstream, as if a rug were being yanked from under them, while the rest of you plunges upstream into the icy current!

To ford a swift creek, hold your hiking stick firmly with both hands, so the current will not push it around; face upstream; plant the stick in front of you; and edge sideways from shore, spreading your legs until you've turned yourself into a tripod. Now, leaning into the current, slide the foot farthest from shore deeper into the creek, then move the other in the same direction. Once you've moved your feet, lift the stick and replant it. Then start the process over, always maintaining a "three-legged" stance.

If the creek is thigh-deep or deeper, and swift, it will be very hard for you to stand up in it, even with a hiking stick. Compounding your difficulties, if the water is cold, it will quickly make your legs clumsy and numb. You might also get your foot trapped between two rocks or within a crevice and find yourself knocked over by the current and held under water. If you must ford such a torrent, in addition to making a tripod of yourself, unbuckle the hip belt on your pack, in case you fall into the water and have to "eject." Also, to greatly increase the traction of your feet on the rocks, pull wool hiking socks on *over* your boots, turning the boots into a hiker's version of felt waders.

If you practice the above precautions, you'll avoid most tumbles, most of the time. But even seasoned guides occasionally take a fall. My last one was a doozy. It happened when Ron Lance, a naturalist who works for the North Carolina Arboretum, and I spent a summer's day exploring the Notch, where Ledbetter Creek cascades 1,000 feet into the Nantahala River. Ron was out of sight when, picking my way across a wet, steep rock face, I came to a head-high ledge blocking my route, with a dead tree trunk lying down over it. I grabbed the tree to steady myself, and it suddenly tipped off the ledge and fell on me. I landed on my back, tree across my belly, and went sliding down the smooth rock face into the Notch, the tree riding me all the way. Just before reaching the point where the slope dropped precipitously 50 feet into Ledbetter Creek, I grabbed a sapling growing out of a crack and came to a precarious stop. Though I was unhurt, I couldn't get up because the tree had me pinned, and I couldn't let go of my handhold. So I yelled for Ron and waited, half embarrassed, half bemused at my predicament.

Climbing down to where I lay, Ron gave me a quizzical look; then he got his feet anchored and lifted one end of the trunk high enough for me to pull myself out from under it. When he let go, the tree plunged into the creek and down the 100-foot chute. Turning to hike back up the slope, Ron made his only comment: "First time I've ever seen someone ridden by a log!" ⊠

Burt Kornegay is an outfitter and guide who runs Slickrock Expeditions—P.O. Box 1214, Cullowhee, N.C. 28723.

WHAT do we do NOW?

Educators are discovering that advanced workshops are highways to a deeper understanding of wildlife and other natural resources.

written by Celeste Wescott Maus
photographed by Ken Taylor

MARBLED SALAMANDER / KEN TAYLOR

Here's a common dilemma for a lot of educators in North Carolina today: You've completed your basic workshop in either N.C. WILD or N.C. CATCH. You're enthusiastic about the hands-on approach of these environmental-education workshops in teaching young people about natural resources and wildlife, and your students are responding well. But you're looking for additional help. You're looking for some advanced concepts to work with.

What do we do now?

Well, the Conservation Education Division has come up with an answer to this question. Eight years ago, Conservation Education field specialists piloted the first Advanced WILD workshop, and the results have been overwhelmingly positive. Today, Advanced WILD and Advanced CATCH workshops are available to any participant who has completed the basic workshop training in N.C. WILD, Aquatic WILD or N.C. CATCH. Seventy-three advanced workshops have been conducted since the initial workshop was held in 1990. Currently, 11 are scheduled for 1998, with seven open for registration.

The advanced workshops cover special topics and offer more in-depth information about specific wildlife species or environmental issues than the basic workshops. If birds are your interest, you can take a workshop in birds of prey or migratory birds. If you want to learn more about aquatic ecosystems, there are workshops on salamanders, mountain stream ecology, wetlands and coastal aquatic ecosystems. A popular advanced workshop is the one on animal tracking. The workshops are offered at locations throughout North Carolina.

These advanced workshops open doors to new ideas and teaching skills. Like the basic workshops, advanced workshops are approved by the N.C. Department of Public Instruction. Participants may receive one to three continuing education units (CEUs) toward their teaching certificate. In addition, advanced workshops are approved as activities that meet the required hours for completion of the North Carolina Environmental Education Certification sponsored by the Office of Environmental Education in Raleigh.

So where do we go from here? If you've just received your basic training in the N.C. WILD or N.C. CATCH program, join hundreds of other elite educators across the state who are taking part in the advanced workshops offered by the N.C. Wildlife Resources Commission. Look at the offerings described on these pages and sign up for one that appeals to you. ⊠

For more information about current workshops or setting up a workshop, please contact: N.C. WILD Coordinator, Division of Conservation Education, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188, (919) 733-7123. You may also contact us through our Web site. The address is: http://www.state.nc.us/Wildlife/ConservationEd/

Coastal Aquatic Ecosystems

This workshop is designed for North Carolina's teaching fellows, recipients of four-year college scholarships who have agreed to teach in North Carolina's schools. It's a popular, week-long series of sessions at a variety of coastal sites. In the activity-crammed week, participants will learn about colonial nesting birds at Battery Island and travel to Carolina Beach State Park to discover "Plants That Bite Back" (carnivorous plants), which is one of Parks' environmental education learning experiences (EELE). A session on beach migration will help the fellows understand the relentless movements of our barrier islands. Educators from N.C. Aquariums will explain their programs. Teaching fellows will actually teach one of the N.C. WILD activities to the group. This workshop is an enriching, hands-on experience for young teaching fellows who will soon be in the classroom.

Birds of Prey

To hunt successfully, predators possess outstanding physical and behavioral adaptations—claws, silent wings, sharp teeth, stealth. But prey animals are hardly helpless. Equally good adaptations help them escape from predators.

Using owls as a focus, this advanced workshop will help educators understand the concept of predation. Participants will learn first-hand about owls, identify simple food chains and actually reconstruct the skeleton of a prey animal found in an owl pellet. The workshop includes activities that illustrate related concepts, including interactions between predators and humans and restoration efforts for selected mammals, birds, reptiles and insects. This hands-on workshop provides a good background for those teaching advanced science and ecology in high school and college.

PRAIRIE WARBLER / MELISSA McGAW

Migratory Songbirds

Most educators are familiar with the seasonal movements of songbirds, but where do the songbirds go and why? More important, what's happening to populations of migratory songbirds?

In this advanced workshop, participants learn more than how to identify birds. They learn about the migratory patterns of songbirds and particularly about neotropical species—birds that breed in North America and migrate for the winter to Mexico, Central and South America and the Caribbean. Many of these neotropical birds are in trouble today because of continuing losses of habitat both here and south of the border. Workshop activities that include role playing provide educational models that participants can use with students.

Salamanders

Did you know that more salamander species live in North Carolina than in any other state in the country? Unfortunately, we are experiencing a rapid decline in the populations of these fascinating creatures.

This advanced workshop, offered in partnership with the U.S. Environmental Protection Agency, will ground the participant in knowledge of the ecology and habitats of salamanders in North Carolina. Rain or shine, workshop participants will go outside to observe newts and salamanders and locate their egg masses. Participants will learn to identify common salamander species and learn also about their local habitat needs and dependence on clean air and water. Like so many animals, salamanders are dependable indicators of habitat quality. Educators will learn how to conduct water sampling tests and create strategies for monitoring and studying critical salamander habitats in their communities.

Tracking

Animal tracking is an old woods skill that is falling into disuse in our urbanizing world. Learning the familiar signs of the animals around us is useful information to help us understand the daily movements of animals.

This advanced workshop will feature the tracks of common mammals found in North Carolina. Educators will not only learn to identify them, but will learn to recognize their sign, trails and walking patterns and the stories they tell. Modern tracking techniques will be a featured part of the workshop. Participants will learn how Global Position System (GPS) and radio telemetry are used to locate animals. The workshop also includes information about the natural history of each animal and its habitat requirements. Participants will analyze the habitat of dominant flora and fauna. ⊠

Upcoming Advanced N.C. WILD Workshops

Below is a listing of upcoming Advanced WILD workshops as of March 1998. For registration, site confirmation and additional workshop information, please call the registration contact.

Date	Workshop	Registration Contact	Location
April 18-19	Migratory Songbirds	Katrina McDougald (919) 751-2040	Cool Springs Environmental Education Center New Bern
*April 24-25	Salamanders	Donna Rogers (919) 541-5478	New River State Park Jefferson
May 16-17	Migratory Songbirds	Amber Parker (919) 870-4330	Blue Jay Point County Park Raleigh
June 1-3	Coastal Aquatic Ecosystems	Laurieann Phalen (919) 249-1106	Camp Don Lee Oriental
June 23-24	Endangered Species	Laura Elliott (704) 877-4423	Pisgah Center for Wildlife Education Brevard
June 29-July 1	Mountain Stream Ecology	Laura Elliott (704) 877-4423	Pisgah Center for Wildlife Education Brevard
July 7-10	Wildlife Tracking	Tim Lemon (336) 957-4382	Forest Service Training Center Crossnore
July 29-30	Bats	Laura Elliott (704) 877-4423	Pisgah Center for Wildlife Education Brevard

*Workshop has been filled and is no longer accepting registrations.

SING A SONG of REDBIRDS

If it's red and at your feeder, chances are it's a male cardinal, North Carolina's state bird. But watch out! At this time of year, it's hopped up on hormonal high-drive.

written by David Lee ©1998
photographed by Dave and Steve Maslowski©1998

In the world of birds the best singers are seldom dressed in brilliant plumage, and the most gifted musicians are usually quite drab. There are exceptions, of course, and the most notable of these is the cardinal.

"In richness of plumage, elegance of motion, and strength of song, this species surpasses all its kindred in the United States," said John James Audubon, the nation's best-known student of birds, about the cardinal. Most North Carolinians seem to agree with him. As curator of birds at the N.C. State Museum of Natural Sciences, I answer phone calls about birds daily, and more of these calls are about cardinals than all other species combined. Perhaps it's because cardinals live close around us, but I think color contributes to their popularity as well.

As every schoolchild knows, the male cardinal's feathers are a bright red, and the female's a light golden brown. This color difference, known as plumage sexual dimorphism, is known in waterfowl, hummingbirds and many songbird species. Yet only a few birds are as strikingly different as male and female cardinals.

The male's color likely explains the bird's role as the state bird of North Carolina. In most cases, state birds—like state flowers and trees—are colorful species that are well known and admired by the residents of a particular state. Of course there are exceptions. In two states poultry became state birds. The Rhode Island Red and the Blue Hen were so elevated in Rhode Island and Delaware respectively, but only because votes were split between several popular songbirds. The Baltimore oriole became Maryland's state bird because it was a good politician—it sported the family colors of Lord Baltimore. Most other states chose their birds based on aesthetic popularity, and the absolute winner was the cardinal. It became the state bird of seven states—Kentucky, Illinois, Ohio, Virginia, West Virginia, Indiana and, of course, North Carolina.

In addition to its official duties as state bird, the cardinal seems to play a role in other parts of our lives as well. How else to explain its appearance at Christmas and on team banners? Every Christmas I keep a tally of the number of Christmas cards we receive with cardinals on them. The percentage is startlingly high. From an ornithological perspective I can think of nothing that these birds do that biologically ties them to the holiday season. The fact that cardinals remain with us through the winter season can't be the only reason for their inclusion. I have never received a Christmas card decorated with a grackle or a cowbird, two other winter residents. No, I think it's the cardinal's color, the same red that appears in holly berries, poinsettias, the suits of bell-ringing Santas, and Rudolf's nose and has become the unofficial color of the Christmas season.

And the cardinal has certainly not been overlooked by people naming athletic teams. You don't need to be a sports fanatic to know that the St. Louis Cardinals are a professional baseball team or that the Phoenix Cardinals play football in the NFL. What are less known are the large numbers of school teams that are named after cardinals. At least 22 colleges use the cardinal as a symbol, and I don't even know how to go about counting the high schools that employ it as a school icon. Stanford University, however, deserves special mention. The student body chose red as the official school color in 1892. It was actually the sportswriters who began to call the university's various sports teams "the Cardinals." From a biological point of view, this is interesting in that cardinals don't even occur in the part of California where Stanford is located.

Cardinals are so popular that they have been deliberately introduced in many places where they don't occur naturally. Despite the numerous species of colorful songbirds in Hawaii and southern California, for example, they have been introduced there. Their introduction in Bermuda is perhaps more understandable, for many of Bermuda's native songbirds have been extirpated.

When I visited Bermuda last fall, my host, David Wingate, the chief conservation officer for the island, put me up in a house on a small offshore island nature reserve. For the last three decades his life's work has been to reestablish the original landscape of Bermuda on this small island. He had reintroduced native plants and animals, collecting individuals from relict sites on the main island. Species that had been entirely extirpated he brought in from the United States. The reestablished night herons, for example, kept the native land crabs in check, which in turn allowed endemic sedges and other lesser plants to flourish. With pride he showed me a stand of beauty berry grown from seeds he collected 20 years before when he had visited me in North Carolina. Wingate's success hinged not only on the reintroduction of natives but also on his effort to exterminate all the exotic species from the reserve. Wherever we went on the island, he pulled out introduced plants, checked rodent traps and removed foreign toads. After all, it was the success of these introduced plants and animals that devastated Bermuda's indigenous flora and fauna in the first place.

Because of this, his acceptance of a pair of cardinals was quite unexpected. Not only were they tolerated, but the two were well looked after. His wife hand-fed them and

The boldly colored *plumage of the male cardinal is a not-so-secret clue to the species' popularity. It's the reason why cardinals are associated with Christmas, with sports teams and with state symbols. The cardinal is the state bird in seven states, including North Carolina.*

Looking a bit rumpled, *this first-year male is still acquiring its flight feathers. Young cardinals have black bills that have been shown to trigger a feeding response from their parents.*

gave the adults names. Sparky, the female, would come and eat out of her hand. The fact that the cardinal, a species introduced to Bermuda a century or more earlier, was accepted on the reserve, while all other exotics were systematically purged, attests to the bond that even hard-core biologists have with this particular bird.

Cardinals occur naturally in a wide area ranging from New Brunswick south to southern Florida and westward to the eastern portions of the Dakotas, and throughout much of Kansas, Oklahoma and Texas. They occur in the southwestern deserts of New Mexico and Arizona and south through most of Mexico and the northern countries of Central America. Ecologically they are extremely adaptive, living in such different life zones as deserts and jungle edges. In North Carolina they occur throughout the state and are absent only from the highest elevations and from some of our coastal barrier islands. Cardinals won't nest on asphalt, but otherwise their habitat demands are modest. Pairs nest in downtown Raleigh, and you can find them in the shrubbery of the Legislative Building.

While cardinals are very wide ranging, and their distribution more or less mirrors that of the forests of the United States, cardinals are not truly woodland birds. You're not likely to encounter them in the interior of a mature forest. Indeed, they seldom venture far from woodland edges. Cardinals are a species of developing woodlands and the edges of mature forests; they live in a world that is neither forest nor meadow.

Our suburban yards, on the other hand, are often havens for cardinals, and here they may exist in densities much higher than they do in more natural settings. Our yards, a mixture of loosely spaced, mature native trees and ornamental plantings, match many of the characteristics of young developing forests and woodland edges, the bird's natural habitat. Bird feeders supplement their natural diets. Already adapted to feed on birdseed, cardinals will eat directly from the feeder or from seed spilled on the ground. Their large, powerful beaks can efficiently manipulate small seeds and open the husks of large ones. Larger than most of the other songbirds attracted to feeders, cardinals usually get more than their share of handouts. They don't wait in line for juncos.

Hang a bird feeder at your kitchen window and you can watch cardinals in action. From these perches, cardinals often watch themselves in action as well, especially in early spring. Male birds heated up with hormones triggered by increasing day length see their reflections in windows and attack them with vigor. I get a lot of calls each spring about this. About half the callers are concerned for the birds, but the birds seldom do serious damage to themselves. The real danger is that while preoccupied with territorial defense, the male is likely to become a meal for the neighbor's cat. Other callers are being driven crazy by the constant fluttering of cardinals against their windows. Covering the window sometimes helps, but usually the aggressive cardinal will just find another rival to attack in some other window. The good news is that the hormonal overload is a brief seasonal phenomenon.

In the South, where nesting starts early, it is not unusual for a pair of cardinals to successfully rear three complete broods in a single season. Often the adult pair will be simultaneously feeding hatchlings in a nest and young fledged from two earlier broods. Indeed, the pair bond between male and female remains strong throughout the nesting season. The females sing throughout courtship and nesting, and incubating females have even been heard singing while on the nest. The young have very distinct colors. Unlike their parents, they have a black bill that triggers a feeding response from their parents and also enables them to move unmolested through the territories of other adult cardinals.

The territories break down in winter, and it is not uncommon to see groups of a dozen or more adult-plumaged cardinals feeding around a single feeder, or on open ground exposed from melting snow. At such times the birds will defend small areas of a few square feet in order to assure their share of the food, but they are not as aggressive as they are during the nesting period. Nonetheless, cardinals remain in the general area of their nesting territories throughout the year, and most cardinals probably remain within several miles of where they were raised throughout their life.

Cardinals are relatively long lived. A banded wild individual lived nearly 16 years, while a captive raised as a household pet lived for over 28 years. But not even 3 percent of the cardinals that leave the nest reach the 3- to 6-year age bracket. Still, these ages are considerably longer than those known for migratory songbirds. As nonmigratory songbirds, cardinals experience less stress than migratory species, contributing to a potential long life and an intense pair bond.

One question I answer several times each summer is "Why is my cardinal's hair falling out?" What the questioner is referring to is the fact that birds are losing their feathers, or molting, and people are surprised by the black color of a cardinal's skin underneath. Actually the growth and molt of feathers are fascinating peculiarities of birds, activities that are not shared with any other kind of animal.

A cardinal's feathers are more than colorful ornamentation; they are essential for insulation and necessary for flight. Because of their importance, they must be kept in good condition. Feathers are nothing more than modified scales, one of many telltale features that link birds to their reptile

ancestors. Like scales, feathers overlap like roofing shingles, and they are both strong and lightweight. Each bird has thousands of individual feathers. A swan, for example, has about 25,000 feathers. Yet only a few of these are used in flight. Cardinals have only 17 flight feathers on each wing and 12 in the tail. These are the only ones used for lift. The other thousands are for insulation. Feathers account for less than 12 percent of the bird's total weight.

Because feathers are so light, most people assume that they are fragile, but ounce for ounce, feathers are some of the most durable structures in nature. Birds have six different types of feathers, each with a different function. A typical feather has a central shaft from which flat vanes protrude. The vanes are composed of numerous barbs, which in turn have small barbules radiating from them. On most of the feathers the barbules are covered with tiny hooks and notches and ridges. The hooked barbules overlap into the ridges and notches to form a solid interlocking structure. If the barbs become disengaged or tangled, the bird can restore the feather by running it through its bill. You can do the same thing with a feather by running it through your fingers. The vanes simply relock with the same efficiency as a zipper, or Velcro.

All this zipping and unzipping of feathers eventually wears them out, and most birds systematically replace them once a year. That is, they molt. The molt takes a lot of energy, and it must be timed so that it does not conflict with other stressful periods of the bird's life history. For cardinals and most other resident songbirds, molting takes place soon after the duties of nesting and rearing young are completed, but before cold weather sets in. Migratory species time their molts so that they don't take place during migration. Only a small percentage of the feathers are replaced at any one time. Thus, the birds remain well insulated and are still able to fly.

Like most other birds, cardinals molt their inner flight feathers first, with the replacement progressing outward. The molt is symmetrical; the two wings replace corresponding feathers simultaneously. This allows the bird to remain balanced while in flight, as the temporary gaps through which air passes must be similar for each wing.

***Male and female** cardinals form unusually intense pair bonds and rearing three broods in a single season is not uncommon. This male is feeding the female as she incubates her eggs.*

Bird-Watching Is Big Money

Cardinals may play a large role in local economies. It's cardinals, after all, as well as a handful of other birds with similar attributes, that hook people into becoming bird-watchers in the first place. In the past decade, the number of people interested in bird-watching has grown 155 percent. According to a nationwide survey compiled by the U.S. Fish and Wildlife Service in 1991, a total of 63 million people spent $5.2 billion watching and feeding birds! In North Carolina during this time, $92.4 million was spent on activities directly related to bird-watching. A big part of this economic increase can be credited to commercially sold bird food. All those sales of little bags of wild birdseed and sunflower seeds add up. In 1991, birdseed dollars for the country totaled $625.7 million. I know from watching my backyard feeders, and you know from watching yours, that cardinals ate their share.

Cardinals start to molt in mid-August when nesting chores are complete. At this time the combination of missing feathers and really old ones makes them look quite ratty. By mid-September the molt is complete, and the cardinal's plumage is at its best.

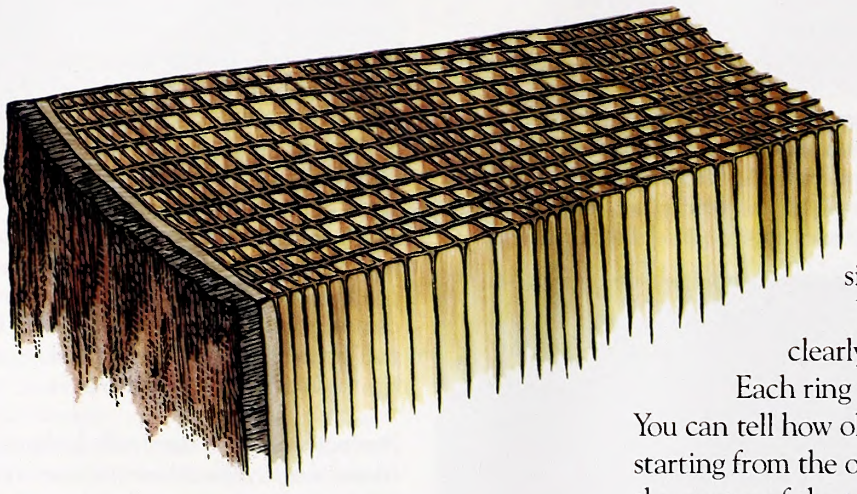
Are populations of cardinals declining? Many people who call me think so and believe they can see this decline in the smaller numbers of cardinals at their bird feeders. I don't have any suggestions as to what they should do about it. The number of cardinals at any given feeder has to do with the time of year, severity of the weather, abundance of natural local foods, and proximity of other bird feeders. People who have been feeding birds for decades are now getting competition from others in their neighborhoods who have taken up the activity. Cold winters will generally bring in more birds for handouts, but protracted cold spells will cause mortality that may take several years of nesting success to overcome. Like other wildlife, cardinal populations run in natural cycles. Without good baseline population estimates and accurate measurements of a number of key factors, you cannot safely say anything about cardinals' numbers.

Of course that doesn't mean I won't be getting calls this year about the problem. And people will still be worried about their balding cardinals. But maybe someone will go out of their way and find me a Christmas card with a grackle. ⊠

What Do Old Trees Know?

Trees can tell fascinating stories of weather and history, pollution and fire. The tales are hidden in their annual rings.

written by Lawrence S. Earley / illustrated by Consie Powell



Most trees in the **temperate regions** of the world increase in size by adding new cells during the growing season. The cells formed in the spring are light-colored while autumn cells are darker. The band of light and dark color forms a single **annual ring**.

You can see annual rings very clearly when you look at a tree stump. Each ring was formed during a single year. You can tell how old the tree is by counting its rings starting from the outer edge and working back to the center of the tree.

Early in the growing season when a tree grows fast, the cells are large and the cell walls are thin. Later in the season, as growth slows, the spaces are smaller, with thick cell walls. This is what makes the wood look light or dark.

READING THE TREE

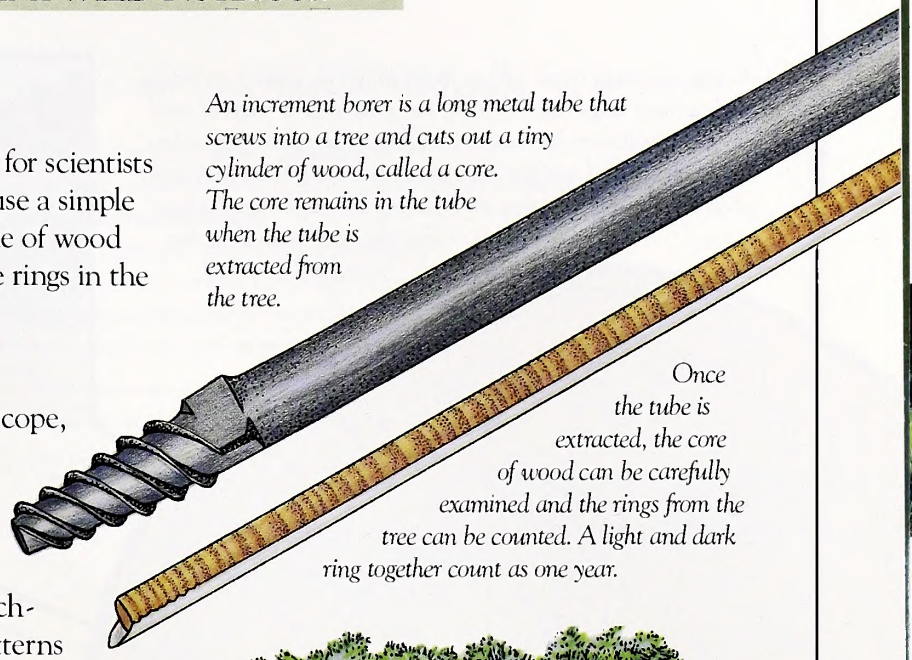
A tree has more stories to tell than just its age. It can tell when fires swept through the forest or even when a volcano erupted. Were dangerous chemicals dumped nearby? Has **acid rain** affected plants? A tree may help answer these questions, too.

The science of using tree rings to date past events or describe past environments is called dendrochronology (pronounced den-dro-kron-AH-lo-gee); the scientists who recover the information hidden in tree rings are called "dendrochronologists."

Not all tree rings are the same width. Narrow rings occur in years when trees grew slowly because of cold weather, insect attack, lack of rainfall, competition from nearby trees and other factors. Wide rings come from years when the tree enjoyed more rainfall and sunlight and grew more quickly.

GETTING TO THE CORE

A tree does not have to be cut down for scientists to look at its annual rings. Dendrochronologists use a simple tool called an increment borer to extract a sample of wood which looks like a very long, thin pencil. The tree rings in the core sample appear as a series of parallel lines.



An increment borer is a long metal tube that screws into a tree and cuts out a tiny cylinder of wood, called a core. The core remains in the tube when the tube is extracted from the tree.

Once the tube is extracted, the core of wood can be carefully examined and the rings from the tree can be counted. A light and dark ring together count as one year.

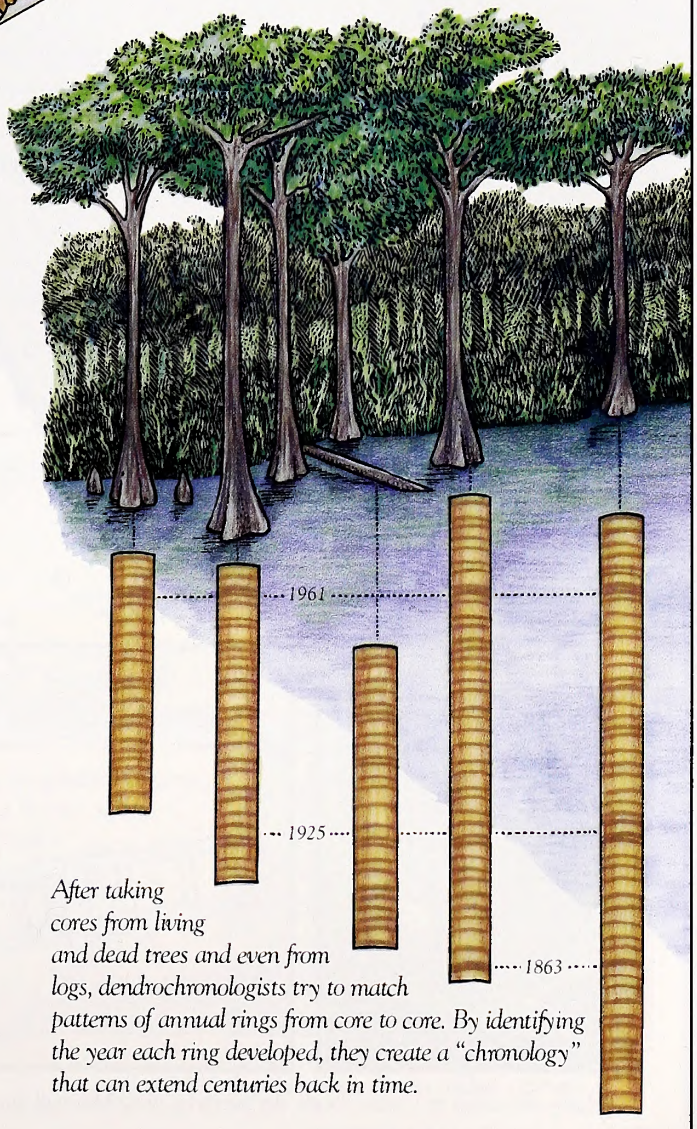
CROSS-DATING

By patiently examining a core under a microscope, a dendrochronologist can identify distinctive growth patterns. For example, one area on the core might show a wide ring followed by three narrow rings, or two wide rings occurring on either side of a very narrow ring. Matching growth patterns like these to identical patterns in cores taken from other trees, both living and dead, is called cross-dating. Using this cross-dating technique, dendrochronologists can create a "**chronology**" to study the past.

MESSAGES HIDDEN IN WOOD

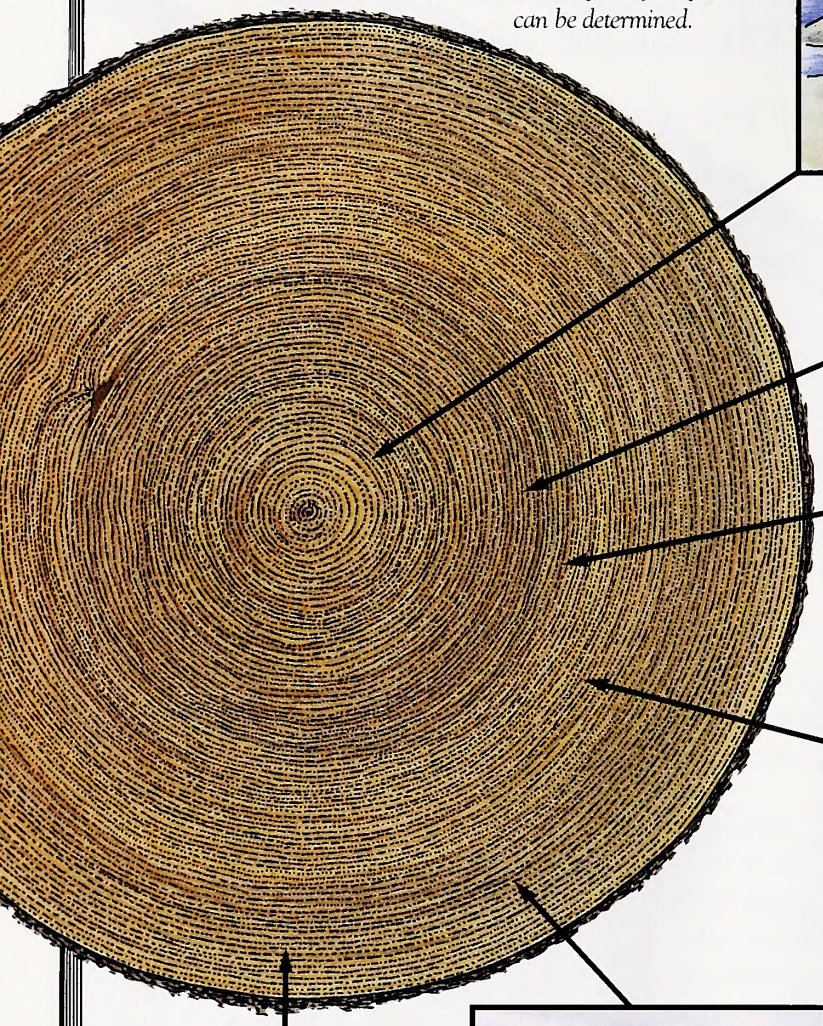
The information contained in chronologies is valuable. **Archaeologists** may use dendrochronology to date an old building. By extracting a core from a log used to construct the building many years ago, they can match it to a master chronology compiled from other trees in the area. They can then determine the exact year the tree used for the building was cut.

Other scientists use chronologies to detect historical weather patterns. In 1985 and 1986, North Carolina suffered through two **drought** years that were worse than any since records have been kept. But just how unusual were they? By using a chronology made from eastern North Carolina bald cypress trees, it was determined that in the last 1,700 years, only five droughts have been worse than the 1985 and 1986 droughts. Such information can help scientists predict future weather patterns.



After taking cores from living and dead trees and even from logs, dendrochronologists try to match patterns of annual rings from core to core. By identifying the year each ring developed, they create a "chronology" that can extend centuries back in time.

A cross section of a tree tells us many things in addition to its age. Wide annual rings mean that the tree grew well in years of good growing conditions. Narrow annual rings may reveal years when droughts occurred and the tree grew only a little. Scars may show when a fire burned the tree. By counting the rings since the fire scar, the exact year of the fire can be determined.



1010: Vikings explore the coast of North America.

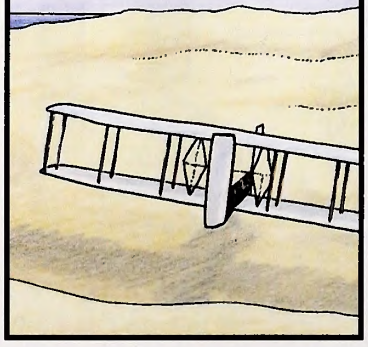
1492: Columbus lands at San Salvador.

1584: Virginia Dare is first child born to English parents in the New World.

1829: Farmer James Capps finds gold in Mecklenburg County; two years later first U.S. gold coins are minted from N.C. gold.

1914: Death of last known Carolina parakeet, millions of which once inhabited bottomland cypress forests.

1903: Orville Wright takes first powered flight at Kitty Hawk.



Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon.

What Does It Mean?

temperate regions: the areas of the world found between the tropic of Cancer and the Arctic Circle or between the tropic of Capricorn and the Antarctic Circle; regions having a moderate climate

annual ring: the cells produced by a tree or shrub in a single year; a thin layer of cells forms early in the growing season and a denser layer forms later in the growing season; together they form the ring

acid rain: any precipitation that has an acidity level lower than normal rainfall

chronology: the record that occurs when dendrochronologists match the rings from one tree to corresponding rings in other living and dead trees; the overlapping patterns can extend many thousands of years back in history

archaeologist: one who studies the physical remains of past human life and activities

drought: lack of rainfall; a prolonged period of dryness

Get Outside

Count rings: Find a tree stump and count the rings starting from the outermost ring (formed in the past year) to the ring in the center of the stump. How old is your tree? Can you see fast-growing and slow-growing years?

Visit the Museum: Come learn the secrets of the bald cypress tree. A program entitled *The Cypress: A Home in the Swamp* will be presented at the N.C. State Museum of Natural Sciences in Raleigh on March 7, 21, and 28 from 12:15-12:45 and 1:15 - 1:45. All programs are free. For more information, call (919) 733-7450.

It's WILD!

Project WILD activities for teachers and students that correlate to this topic include:

Visual Vocabulary: teaches students to interpret and identify ecological concepts.

Here Today, Gone Tomorrow: teaches students to identify and describe some causes for extinction of animal species.

Fire Ecologies: teaches students to identify, describe and evaluate effects on wildlife that result from forest and grassland fires.

Get WILD

The Wildlife Commission will hold a series of advanced N.C. WILD workshops for educatiors in the coming months. They include:

June 1-3—*Coastal Aquatic Ecosystems of the Lower Neuse River*, Camp Don Lee, Oriental - Laurieann Phalen (919) 249-1106.

June 23-24—*Endangered Species*, Pisgah Center for Wildlife Education - Laura Elliott (704) 877-4423.

June 29-July 1—*Mountain Stream Ecology*, Pisgah Center for Wildlife Education, Pisgah Forest - Laura Elliott (704) 877-4423.

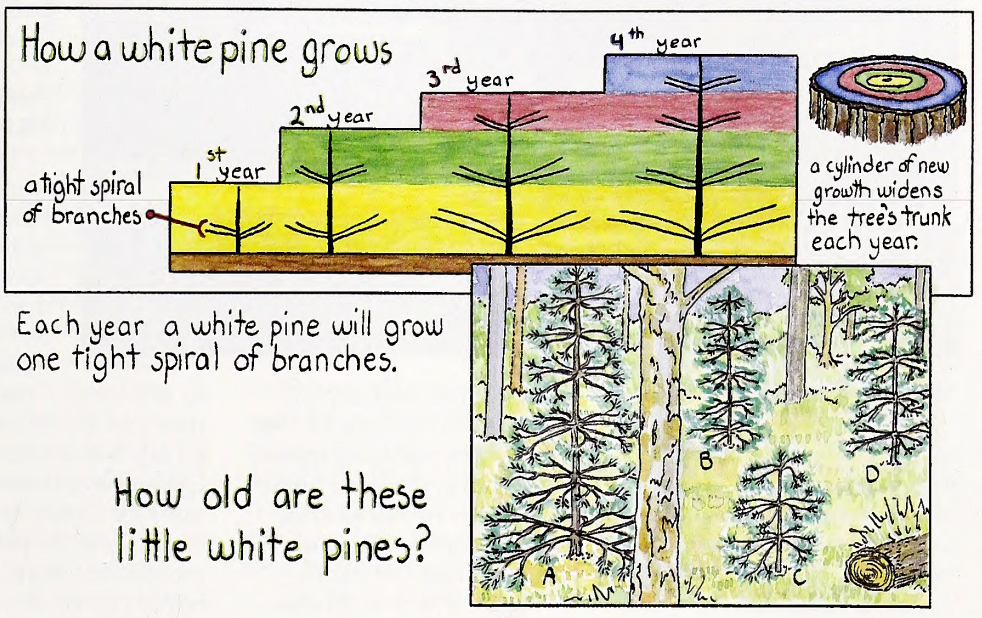
To sign up or to learn more details, call the listed contact or check our web page at **http://www.sips.state.nc.us/Wildlife/ConservationEd/wild/calendar/**

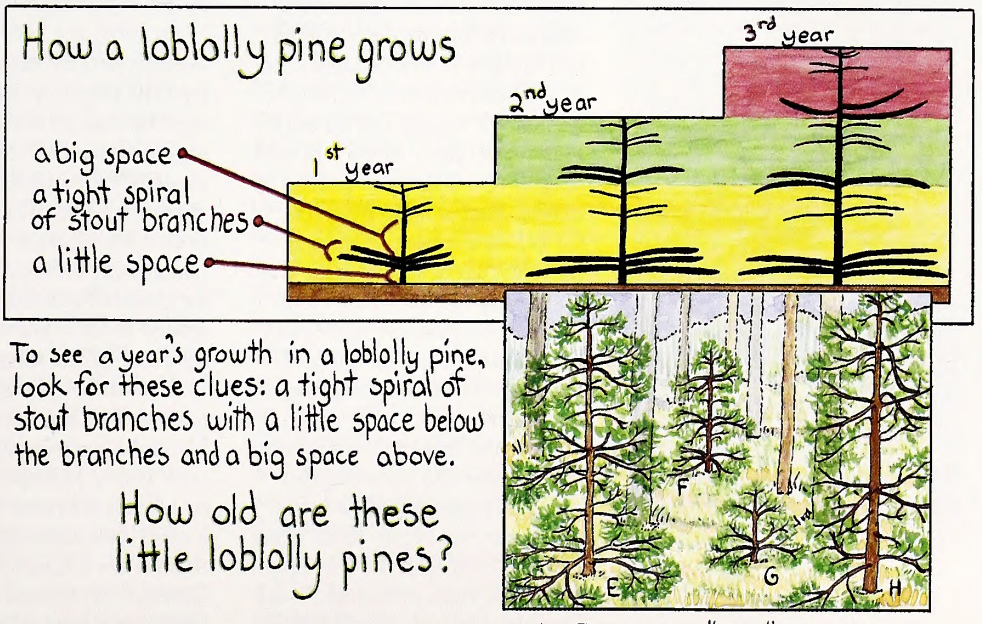
Read and Find Out

- "*February: Good Oak*" in *A Sand County Almanac* by Aldo Leopold, Oxford University Press, 1987.
- *Outside and Inside Trees* by Sandra Markle, Scholastic, 1993.
- *Tree-Ring Dating and Archaeology* by M.G.L. Baillie, University of Chicago Press, 1982.

Some web sites about dendrochronology:

- Crossdating—The basic principle of dendrochronology: http://www/ltrr.arizona.edu/people/henri/lorim/basic.htm
- Frequently asked questions about dendrochronology: http://aqua.civaq.unimelb.edu.au/-argent/treefaq.htm





Historic Dam Removal Opens Up Neuse River for Fish

JIM PAGE/DENR

***Many top state and** federal environmental officials were on hand last winter (above) to celebrate the historic removal of the Quaker Neck Dam near Goldsboro. The dam's removal will open up 75 miles of the Neuse River and 925 miles of its tributaries for spawning striped bass, shad and sturgeon.*

Written and Edited by Rodney Foushee

Striped bass, shad and sturgeon will once again be able to reach their traditional spawning grounds in the upper Neuse River this spring thanks to the historic removal of the Quaker Neck Dam near Goldsboro.

The 260-foot long dam has effectively blocked spawning migratory fish since it was built by Carolina Power & Light Co. in 1952 to provide water for the company's nearby Lee Steam Plant. The dam is being removed thanks to a landmark public-private partnership between CP&L and a host of federal and state agencies including the N.C. Wildlife Resources Commission. Demolition of the dam began last fall and its removal was expected to be completed by January.

"For the first time in 45 years, striped bass and other anadromous fish species will have free passage in the Neuse River from Pamlico Sound all the way up to Milburnie Dam in Raleigh," said Franklin McBride, the Wildlife Commission's fisheries habitat conservation program manager.

The removal of the concrete structure will open 75 miles of the Neuse River and about 925 miles of its tributaries for spawning fish. "This should provide a good opportunity for striped bass and other species to recover in the Neuse River system," McBride said.

Historically, striped bass and other anadromous species moved freely from the Atlantic Ocean up the Neuse River as far as Durham County to lay their eggs. But that ended when CP&L built the 12-foot-tall Quaker Neck Dam to provide water for cooling at the Lee Steam Plant. Despite the impact on the fishery, the project helped provide electricity for people in eastern North Carolina.

In 1989, the U.S. Fish and Wildlife Service determined that the privately owned dam was the major block to fish migration in the Neuse River, especially for striped bass and American shad. The construction of Falls Lake near Raleigh had already reduced the need for Quaker Neck Dam, so CP&L agreed to allow the dam to be removed by the state.

In October, the N.C. Department of Environment and Natural Resources signed a contract with a Jacksonville company to clear a bypass canal, build a small dam across the canal and remove the Quaker Neck Dam. Grants from several state and federal agencies and the National Fish and Wildlife Foundation paid for the removal project.

Many top environmental officials including U.S. Interior Secretary Bruce Babbitt and Department of Environment and Natural Resources Secretary Wayne McDevitt were on hand at a ceremony in December honoring the private-public partnership to remove the dam.

"This project will be a major benefit to our commercial and recreational fishing business in North Carolina and to fishermen all along the Atlantic Seaboard," McDevitt said. "It also underscores how a private business like CP&L can work successfully with state and federal agencies to improve the quality of our environment for generations to come."

With the dam removed, anglers can expect to catch more hickory and American shad as well as small stripers in the upper Neuse River this spring, McBride said. But with few large adult stripers left in the Neuse, it will take careful management over several years for the population to begin to recover.

"The viability of the eggs should be fine, and the water quality of the upper Neuse is fairly good," McBride said. "Whether the young fish are able to survive in the lower river remains to be seen. We still have to clean up the river."

Efforts are underway to reduce the amount of nitrogen being discharged into the Neuse River. And the Wildlife Commission will likely develop a fisheries management plan for the waterway to speed up the recovery of striped bass and other species.

The removal of the Quaker Neck Dam also opens the possibility for other dams to be unplugged for fish habitat. "This is the first dam we've ever removed in North Carolina for the environment," McBride said. "Let's hope it isn't the last."

State Natural Sciences Museum Obtains Giant Dinosaur Skeleton

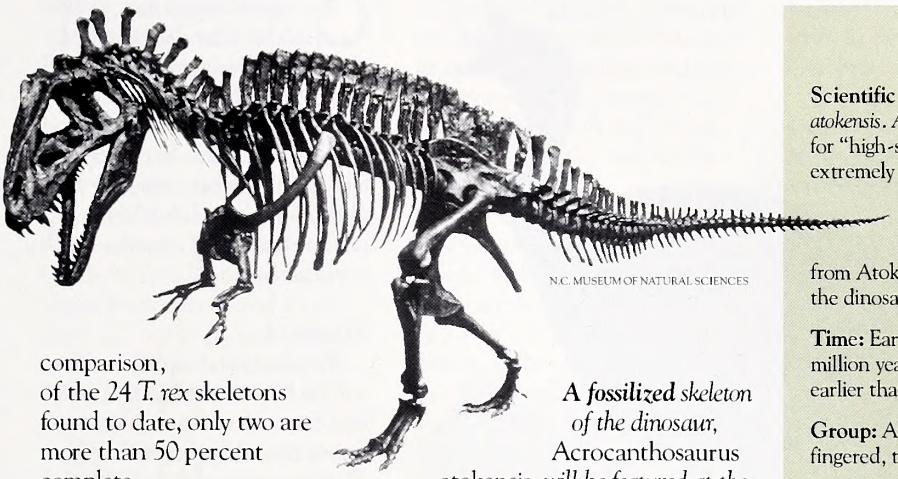
The fossilized skeleton of a rare predatory dinosaur, *Acrocanthosaurus atokensis*, will be the centerpiece display at the new N.C. State Museum of Natural Sciences in Raleigh.

The giant skeleton was purchased in December by the Friends of the Museum, a nonprofit support group, and by anonymous donors for $3 million. The skeleton will be the only one of its kind exhibited anywhere in the world when the new North Carolina museum opens in 1999.

Nicknamed the "Terror of the South," *Acrocanthosaurus* roamed the Earth 112 million years ago, 45 million years earlier and farther south than the more recognizable *Tyrannosaurus rex*. The only giant North American carnivore of its time, *Acrocanthosaurus* (ak-ro-KAN-tho-SAWR-us) preyed on dinosaurs much larger than itself. Its strangest feature is a series of large spines atop the vertebrae of its back, hips and tail, for which it is named. The muscular skull measures 4½ feet long and the jaw contains 68 thin, knife-like teeth. Its powerful arms end in three wickedly curved, scimitar-like claws. Fearsome "Acro" stretches 40 feet long.

"If we had first pick in the 'dinosaur draft' there is no doubt that we would have selected this one," said John McMillan, president of the Friends. "It's equally as large and ferocious as *T. rex*, but unlike that dinosaur, *Acrocanthosaurus* likely lived in North Carolina. Plus, there is no other mountable *Acrocanthosaurus* in the world. Its rarity makes it extremely valuable to science."

Only four acrocanthosaurs have been discovered and the museum's specimen is by far the most complete. About 54 percent of Acro's bones were recovered, a rarity in paleontology. By comparison, of the 24 *T. rex* skeletons found to date, only two are more than 50 percent complete.



N.C. MUSEUM OF NATURAL SCIENCES

***A fossilized** skeleton of the dinosaur,* Acrocanthosaurus atokensis, *will be featured at the new N.C. State Museum of Natural Sciences in Raleigh when it opens in 1999. Only four such skeletons have been discovered in the world.*

The museum's specimen is the most complete early Cretaceous large carnivore ever found in North America. "We can learn from *Acrocanthosaurus* how the history of dinosaurs in the South may have been different than that of the better known dinosaurs in western North America," said Dale Russell, the museum's senior curator of paleontology. "It's a really spectacular example of the kinds of dinosaurs that probably lived in North Carolina at the time."

Ancient coastal plains where Acro hunted are now submerged, making discovery of their bones here nearly impossible. "A delta containing sediments the same age as those where Acro was found lies buried under the waters of the Pamlico and Albemarle sounds," Russell explained. "It's the right age, contains evidence of similar environments and probably also Acro bones, but they are hidden from us."

The dinosaur's bones were first discovered in the early 1980s by a teenager, and excavation began in 1983. Two amateur fossil collectors spent three years extracting the bones from private land in Oklahoma. The dinosaur was purchased by Geological Enterprises Inc. of Ardmore, Okla., which sold the specimen to the museum. Final preparation of the bones will be done by the Black Hills Geological Institute in Hill City, S.D., which has been preserving the fossil for the past eight years.

The fossilized skeleton will stand in the new N.C. Museum of Natural Sciences, which opens in 1999. The giant dinosaur will be exhibited in a diorama depicting the plants and animals of the ancient South. "This early Cretaceous predator will enhance the story being told in the Prehistoric North Carolina exhibit, where casts of several other dinosaur species will portray the late Cretaceous period," said Museum Director Betsy Bennett. "In the new building, we are depicting North Carolina's diverse natural environment and relating it to the rest of the world. *Acrocanthosaurus* does that wonderfully."

The new $55 million museum will be four times larger than the existing facility.

—Information courtesy of the N.C. State Museum of Natural Sciences

Acro Facts:

Scientific name: *Acrocanthosaurus atokensis*. *Acrocanthosaurus* is Greek for "high-spined lizard," after the extremely long spines along the top of the dinosaur's back, hips and tail. The species name, *atokensis*, comes from Atoka County, Okla., where the dinosaur was first found.

Time: Early Cretaceous, about 112 million years ago (45 million years earlier than *Tyrannosaurus rex*).

Group: Allosauroids—three-fingered, two-legged meat-eaters.

Size: The largest predator of its time (40 feet long, 13 feet tall, weighing 5,280 pounds (2.6 tons). Comparable in size to *T. rex*.

Physical details: Long spines run from back to tail. Head measures 4½ feet long, 3 feet high and 2 feet wide. Its jaw has 68 thin, knife-like teeth. Eyes face to the side, meaning Acro cocked its head on one side to examine its prey. Each 3-foot arm ends in three sharp, curved claws used to tear flesh from bones.

Range and Habitat: Acro remains have been discovered in Oklahoma, Texas and Maryland. Similar conditions in these regions during the early Cretaceous period suggest that Acro ranged across the low, flat coastal plains of the Southeast including North Carolina.

Feeding: The only giant carnivore of its time, Acro preyed on dinosaurs larger than itself (below). Fossilized footprints show that it ran alongside its prey and then lunged, using its clawed arms to grip its prey.

ARTIST'S RENDITION BY KAZUHIKO SANO

Wild Turkey Federation Offers Print

***This colorful print of the elusive** ocellated turkey (Agriocharis ocellata) by Thomas A. Bennett is the first in a series of prints offered by the N.C. chapter of the National Wild Turkey Federation covering the American wild turkeys. Though the ocellated turkey is found in Central America, proceeds from the sale of this limited-edition print will benefit wild turkey restoration projects in North Carolina. To obtain the print or for more information, call Larry Smith at (919) 942-1179.*

Calendar of Events

On several occasions, events in this calendar have been changed without notice.

Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

March 14

Reptile and Amphibian Day will be held at the North Carolina State Museum of Natural Sciences in downtown Raleigh. The free event will include educational displays and activities as well as numerous live snakes, frogs and other reptiles and amphibians. For more information, call Bob Flook at (919) 733-7450.

March 31-April 5

The 28th annual Grifton Shad Festival will be held in Grifton. The festival will feature more than 30 events including clogging, crafts, canoe races, historic exhibits, fishing contests and an archery tournament. For more information contact Janet Haseley at (919) 524-4356.

April 4

The North Carolina Partners in Flight annual meeting will be held at Blue Jay Point County Park near Falls Lake in Wake County. The event will feature presentations by biologists detailing methods for conserving migratory songbirds. For more information, call N.C. Partners in Flight Coordinator Mark Johns at (919) 852-5124.

Field Notes

Wild Turkey (bearded birds only)	April 11-May 9
Hatchery-Supported Trout Waters	Opens April 4
Wild Trout Waters	Year-Round
Waterfowl	
Snow and Blue Geese	Through March 10

Information on bag limits and other regulations may be found in the *1997-98 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission. **For more information on waterfowl regulations and limits, call 1-800-675-0263.**

Nature Conservancy Protects 500 Wetland Acres

Nearly 500 acres of wetlands in northeastern North Carolina have been preserved for wildlife habitat and outdoor recreation thanks to joint efforts between The Nature Conservancy and the N.C. Wildlife Resources Commission.

The Nature Conservancy, working with the Wildlife Commission to protect a wildlife corridor along Conoho Creek in Martin County, recently purchased 264 acres of swamp forest along the creek. Conoho Creek forms an integral part of the lower Roanoke River floodplain ecosystem and supports habitat for river otters, minks and weasels as well as wood ducks, turkeys and many songbird species.

In a separate purchase in December, The Nature Conservancy bought 235 acres of one the highest quality freshwater marshes in North Carolina on behalf of the Wildlife Commission. The tract is located at Gibbs Point on the North Landing River in the extreme northern portion of Currituck County.

"The freshwater marshes along the North Landing River are a wildlife paradise and biological treasure," said J. Merrill Lynch, assistant director of protection for The Nature Conservancy's N.C. chapter. "The protection of this tract represents an important first step in our conservation efforts in this area."

Most of the area near Gibbs Point is high-quality freshwater marshes that provide habitat for bald eagles, wading birds and wintering waterfowl. The tract will be transferred to the Wildlife Commission to be managed as a game land for public hunting, boating and wildlife viewing.

—Information courtesy of The Nature Conservancy

ATV Donated

Wildlife officers in the North Carolina foothills will be able to double their patrols in difficult terrain this spring thanks to the efforts of a local Trout Unlimited chapter.

The Dogwood Anglers Chapter of Trout Unlimited has donated a new all-terrain vehicle to the N.C. Wildlife Resources Commission for patrol work in parts of Iredell, Davie, Alexander, Yadkin, Wilkes and Forsyth counties. Before the donation, the 20 wildlife enforcement officers assigned to the district had only one ATV to patrol difficult terrain. The Dogwood chapter, based in Statesville, purchased the ATV from a local dealer. Wildlife Commission personnel have since built a trailer for transporting the vehicle using donated supplies.

Wild Hens Form North Carolina Chapter

The first ladies chapter of the National Wild Turkey Federation outside of Wisconsin has been chartered in North Carolina.

The "Carolina Wild Hens" held their first banquet on Oct. 25 in Rocky Mount with immediate success. The event raised nearly $25,000 for wild turkey restoration efforts and more than 120 members and sponsors signed up. In addition, 35 "jakes," youths ages up to 17, joined the chapter.

The National Wild Turkey Federation has been instrumental in assisting the N.C. Wildlife Resources Commission and other state wildlife agencies in restoring the wild turkey. Most of the money raised by local chapters is earmarked for the federation's state and national Super Fund accounts, which are used to relocate wild turkeys, improve turkey habitat and educate the public. However, until recently, nearly all of the organization's chapters were made up of mostly men.

"We decided to form a ladies chapter to get more women involved with turkey hunting and restoration work," said Carolina Wild Hens President Kathy Smith. Most of the founding members of the chapter met at the Wildlife Commission's Becoming An Outdoors Woman Program held at Western Carolina University in May.

The BOW program, designed to teach outdoor skills to women, brought a lot of people with similar interests together, Smith said. By June, the Carolina Wild Hens chapter was formed with members from as far away as South Carolina and Virginia.

The group plans to hold its second banquet on Sept. 12 in Rocky Mount. For more information or to join the Carolina Wild Hens, call Smith at (919) 937-4351.

Wildlife Officers Take Police Olympics Honors

***Five Wildlife Commission enforcement officers** were honored for their performances in the N.C. Police Olympics held in September. (From left to right) Capt. Ken Craft won a shotgun and handgun competition, Officer Barry Joyce won a gold medal in the shotgun event, Sgt. John Massey won a gold in weight lifting and Pilot Rick Purcell took three golds in karate. Officer Todd Kennedy (kneeling) received a bronze medal in the Toughest Cop Alive competition.*

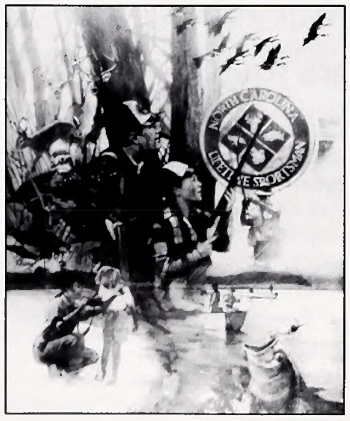
Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report



Totals Through December 1997

Principal Balance
$24,711,675.60

Interest Earned
$24,796,499.79

Total Receipts
$49,508,175.39

Interest Used
$12,329,807.04

Fund Balance
$37,178,368.35

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Preventing Deer Damage

by Rodney Foushee

Damage caused by deer browsing on backyard trees and shrubs can be a problem in some rural and many suburban areas in North Carolina. With spring nearly upon us, here are some tips for keeping deer out of your azaleas.

Recognizing the Problem: Identifying deer damage is not difficult. Because they lack upper incisors, deer often leave a jagged or torn surface on stems and twigs. Rabbits and rodents, on the other hand, leave clean-cut surfaces.

Exclusion Methods: One of the most effective, if costly, ways to keep deer away from valuable ornamental shrubs and fruit trees is to build fences. Both electric and high-tensile fences can provide year-round protection from browsing deer, but they must be tall enough to prevent nimble white-tails from leaping over them. A less costly approach for protecting individual young fruit trees is to install wire or plastic shelters around their bases to prevent excessive deer damage.

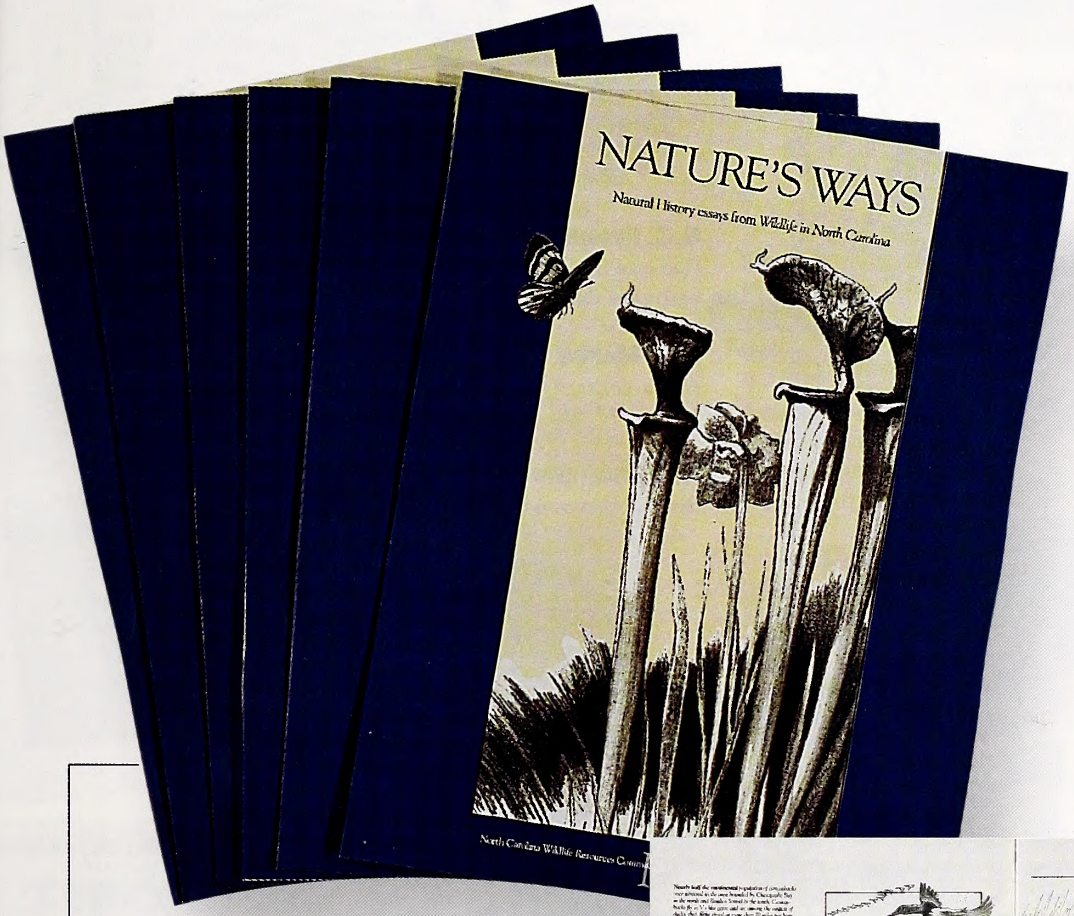
Repelling Deer: A strand of electric fencing with peanut butter on foil strips can be used to repel deer with excellent results. After a few attempts at eating the peanut butter, deer will quickly learn to avoid the area. A dog restricted by a fence will also provide all the noise needed to keep deer out of the average backyard. And a variety of chemical repellents designed to make ornamental shrubs and trees taste bitter to deer are available at farm and gardening centers.

Plant Choice: Probably the best long-term solution to reduce problems is to plant shrubs and trees that are less attractive to deer and more resistant to damage. Species that are rarely damaged by deer include: barberry, boxwood, dogwood, Russian olive, American holly, Colorado blue spruce, Japanese flowering cherry and inkberry. At the other end of the spectrum are plants that are frequently severely damaged by deer. These should be avoided in problem areas and include: balsam fir, Fraser fir, eastern redbud, English ivy, apples, cherries, plums, rhododendrons, azaleas and tea roses.

Of course, no plant species is completely deer resistant. Reducing the amount of fertilizer you use will slow your plants' growth, but it will also make them less nutritious and therefore less appealing to deer. For more information on reducing deer damage, contact your local district wildlife biologist. For a more complete list of ornamental plants and their resistance to deer, call the Wildlife Commission's Division of Wildlife Management at (919) 733-7291.

N.C. WILD STORE

Explore the Mysteries of Nature



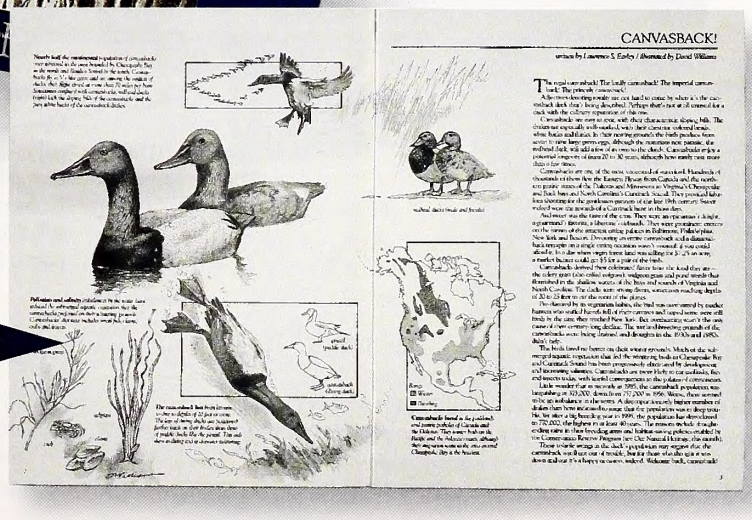
NATURE'S WAYS
Natural History Essays from Wildlife in North Carolina

Why do some birds decorate their nests with snake skins? Why is the Roanoke bass found in only a few rivers in North Carolina? How did the ivory-billed woodpecker become extinct?

For nearly 20 years, the illustrated "Nature's Ways" columns in the pages of *Wildlife in North Carolina* have answered scores of questions like these in brief, entertaining essays. Now more than 200 of these essays have been collected in six paperback volumes that will delight readers, young and old, with their eye-opening insights into North Carolina's natural curiosities.

A wonderful gift for every nature lover!

Sold only as a 6-volume set. $27.50.
ITEM CODE M9


CANVASBACK!

Short essays and beautiful illustrations have been the formula to the popularity of "Nature's Ways" over the years. This article on the comeback of the canvasback duck in North Carolina is one of over 200 articles in the collection. They can easily be photocopied and used in the classroom, and parents and children also can read them together at home.

More terrific items ☛

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

White, 100% cotton (preshrunk) T-shirts are guaranteed for comfort and durability. Each shirt features an original design.

N.C. WILD T-SHIRT
N.C. WILD logo printed on front and colorful art on back. $14.50.
ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE IN N.C. T-SHIRT
WINC magazine logo on front pocket. Tundra swan art on back. $14.50.
ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

LIZARDS OF N.C.
Shows all 12 of the state's lizard species. 22" x 34". $6. ITEM CODE **P3**

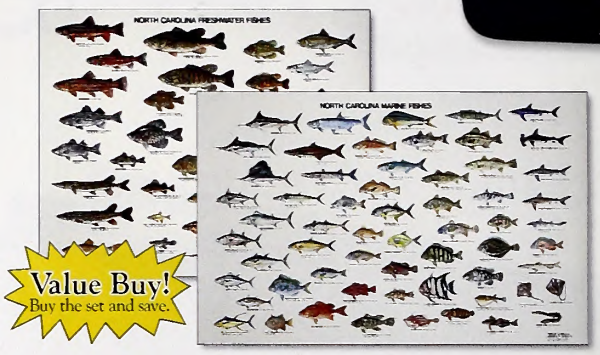
TURTLES OF N.C.
Shows all 21 of the state's turtle species. 22" x 34". $6. ITEM CODE **P4**

SNAKES OF N.C. (LIVEBEARERS)
Shows all 17 of the state's livebearing snake species. 22" x 34". $6. ITEM CODE **P5**

SNAKES OF N.C. (EGGLAYERS)
Shows all 19 of the state's egg-laying snake species. 22" x 34". $6. ITEM CODE **P8**

SET OF 4 POSTERS
You'll save $6 by purchasing the set of four posters above. $18.
ITEM CODE **P10**

N.C. WILD CAP
N.C. WILD logo is embroidered on a pro-shape, brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. $16.50.
ITEM CODE **A1**



N.C. FRESHWATER FISHES
Find your favorite fish with this color poster showing 36 of the state's freshwater fishes. 28" x 22½". $6. ITEM CODE **P6**

N.C. MARINE FISHES
All the colors of the sea can be found on this poster of 60 marine fishes. 35" x 22½". $6. ITEM CODE **P7**

N.C. FRESHWATER FISHES AND N.C. MARINE FISHES
Save $2 when you buy both posters as a set. $10. ITEM CODE **P9**

WILDLIFE IN N.C. CAP
Buck deer silhouette with magazine logo is embroidered on a pro-shape, washed-canvas cotton cap with an adjustable cloth strap and buckle closure. Two-tone cap is navy/stone. $16.50.
ITEM CODE **A2**

DOGS THAT POINT, FISH THAT BITE
Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission; hardbound; 220 pages. $19.95. ITEM CODE **M8**

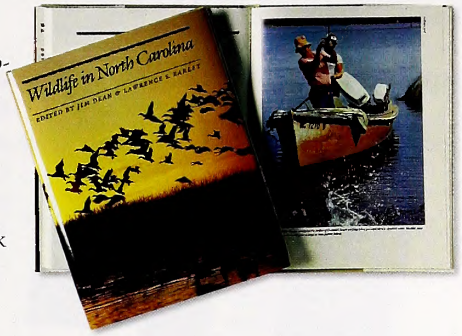
WILDLIFE IN N.C. CAP
Brook trout and magazine logo are embroidered on a sage-colored, premium weight, pigment-dyed, brushed cotton cap with an unstructured front, an extended bill, and a nubuck suede closure. $16.50. ITEM CODE **A3**

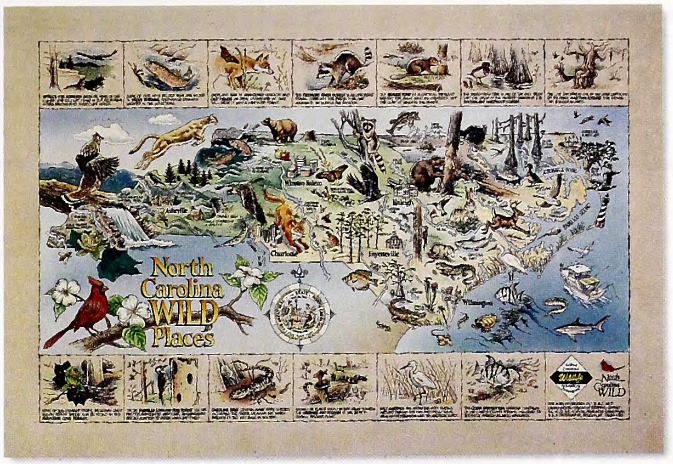
Wildlife in North Carolina Book

The best of *Wildlife in North Carolina* magazine. Hardbound. $12.
ITEM CODE M3

Magazine Binder

Store 12 issues of the magazine in this sturdy brown leather-look binder with gold lettering. $10.
ITEM CODE M2





North Carolina WILD Places Map

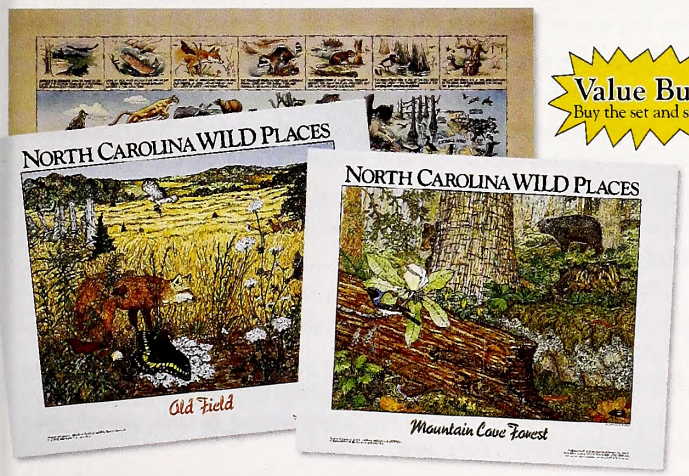
Artist's Proof. $40. ITEM CODE E2
Limited Edition. $25. ITEM CODE E3
Poster. $6. ITEM CODE E4

Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.
ITEM CODE M6

North Carolina WILD Places: A Closer Look Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. $6.
ITEM CODE E7



North Carolina WILD Places Posters

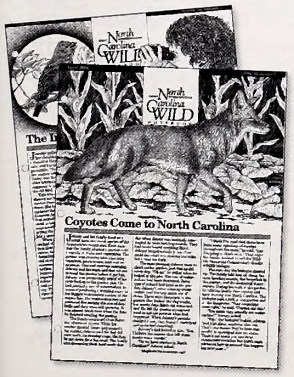
(Set of 3): Posters of "Old Field" and "Mountain Cove Forest" from *North Carolina WILD Places: A Closer Look*. 19½" x 16". Shipped folded with poster version of WILD Places Map. $8. ITEM CODE E5

WILD Places book and posters

Buy the *North Carolina WILD Places* book and all three posters and save! (Items E1 and E5) $16. ITEM CODE E6

North Carolina WILD Places: A Closer Look

Easy-to-read text and Anne Marshall Runyon's delightful illustrations make wildlife habitats come alive in this 82-page book. Discusses 13 habitats across the state. $10.
ITEM CODE E1



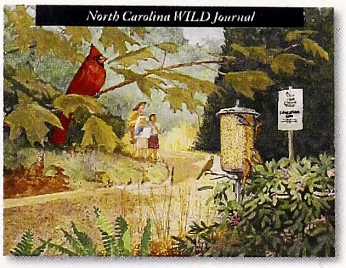
N.C. WILD Notebooks

Each set contains eight issues of *North Carolina WILD Notebook*, the Wildlife Resources Commission's prize-winning conservation education newsletter.
$3 per set.

1995-1996 Set ITEM CODE E11
1996-1997 Set ITEM CODE E12

North Carolina WILD Journal

Handy calendar notes on wildlife behavior through the year, with room for personal observations. Supplements N.C. WILD Education Sites workshop. $6.
ITEM CODE E8



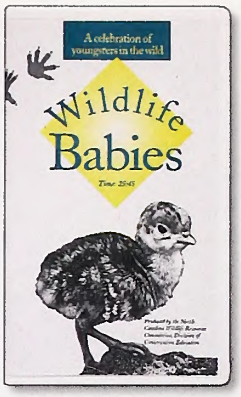
Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
Cub & Boy Scout Correlation. ITEM CODE E9
Girl Scout Correlation. ITEM CODE E10

More terrific items ☛

N.C. WILD STORE

Value Buy!
Buy the set and save.



Wildlife Babies

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others. $20. ITEM CODE **N9**

Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. $2. ITEM CODE **M5**

All Things Are Connected

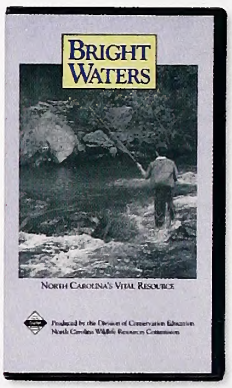
Stirring 12-minute video adaptation of Chief Seattle's speech introduces environmental ethics. $20.
ITEM CODE **W1**

This Land Is Sacred (Teacher's Guide)

Classroom activities to accompany All Things Are Connected video. $4.50. ITEM CODE **W2**

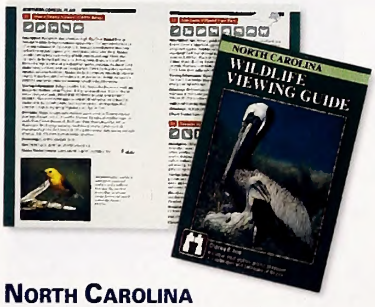
All Things Are Connected & This Land Is Sacred

Video and Teacher's Guide package. $22. ITEM CODE **W3**



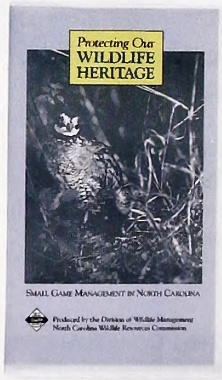
Bright Waters (Video)

30-minute video on fishing and fisheries management in North Carolina's freshwater creeks, rivers and ponds. $20. ITEM CODE **N7**



North Carolina Wildlife Viewing Guide

This color guide will lead you to 90 of the state's best wildlife viewing sites. $5.95. ITEM CODE **N6**



Protecting Our Wildlife Heritage (Video)

25-minute video offers useful tips for landowners on managing small game. $20. ITEM CODE **N8**

WILDlife Profiles

Each set is designed to fit your standard 3-ring binder and features 10 animal fact sheets. **$2 per set.**

Set 1. Black bear, raccoon, white-tailed deer, striped skunk, bobwhite quail, wild boar, muskrat, mourning dove, coyote, mallard. ITEM CODE **W4**

Set 2. Mink, canvasback duck, red fox, wild turkey, beaver, American river otter, Canada goose, bobcat, red wolf, cougar. ITEM CODE **W5**

Set 3. Humpback whale, black duck, osprey, clapper rail, red-shouldered hawk, cottonmouth, diamondback terrapin, largemouth bass, black crappie, channel bass. ITEM CODE **W6**

Set 4. Brook trout, garden spider, Tar spiny mussel, wood duck, bullfrog, mayfly, tiger salamander, bog turtle, hellbender, shortnose sturgeon.
ITEM CODE **W7**

Set 5. Cottontail rabbit, gray squirrel, northern flying squirrel, newt, common crow, red-tailed hawk, prothonotary warbler, bluegill, striped bass, Eastern oyster. ITEM CODE **W8**

Set 6. Opossum, peregrine falcon, Eastern bluebird, American toad, rat snake, Eastern glass lizard, smallmouth bass, brown trout, monarch butterfly, Virginia big-eared bat. ITEM CODE **W9**

Set 7. Chipmunk, gray fox, bald eagle, loggerhead shrike, common snapping turtle, five-lined skink, bluefish, rainbow trout, grasshopper, horseshoe crab.
ITEM CODE **W10**

Set 8. Appalachian cottontail, manatee, barred owl, turkey vulture, Neuse River waterdog, spring peeper, coral snake, American alligator, American eel, American shad. ITEM CODE **W11**

Set 9. Southern flying squirrel, fox squirrel, great horned owl, snowy egret, Southern leopard frog, corn snake, Atlantic sturgeon, walleye, luna moth, crayfish. ITEM CODE **W12**

Set 10. Marsh rabbit, woodchuck, hooded warbler, whippoorwill, green salamander, copperhead, fence lizard, muskellunge, chain pickerel, Scotch bonnet. ITEM CODE **W13**

Set 11. Atlantic croaker, Southern flounder, summer flounder, spot, king mackerel, Spanish mackerel, sea mullet, weakfish, spotted seatrout, striped mullet. ITEM CODE **W14**

Set 12. Bay scallop, black sea bass, blue crab, brown shrimp, spiny dogfish and smooth dogfish, gag, hard clam, menhaden, sandbar shark, white perch.
ITEM CODE **W15**

N.C. WILD STORE ORDER FORM

Use this form to order educational products. Use the magazine subscription form inside for magazine orders.

Provide your shipping information here. Please give a street address; we cannot deliver to a post office box.

Name _____ Home phone (___) ___-____
first name MI last name area code

Mailing Address _____

Shipping Address _____

City _____ State ___ Zip _____-____

ITEM CODE	ITEM NAME/DESCRIPTION	SHIRT SIZE	QUANTITY	PRICE	$ TOTAL

Make checks payable to: N.C. Wildlife Resources Commission. Send your order to: The N.C. WILD Store, PO Box 29607, Raleigh, N.C 27626-0607.

All orders must be prepaid. We do not bill. Please do not send cash. Allow 4 weeks for delivery of your order. $20.00 service charge for returned checks (N.C.G.S. 25-3-512). Products may be purchased over the counter at The N.C. WILD Store, 322 Chapanoke Road, Raleigh, N.C. Telephone (919) 662-4377.

→ (Do not include magazine subscriptions.) ..... **SUBTOTAL**	$
→ (Subtract 15% for retail orders of $100 or more.) ..... **DISCOUNT**	$
→ (N.C. residents add 6% sales tax.) ..... **TAX**	$
→ (See shipping chart below.) ..... **SHIPPING & HANDLING**	$
→ (Add all items above.) ..... **TOTAL**	$

For credit card orders, provide information below.

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EXP. DATE

( )
Daytime Phone Number

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SHIPPING & HANDLING MUST BE INCLUDED OR ORDER WILL BE RETURNED
Shipping and handling based on subtotal.
$10.00 and under, **ADD** $2.00
$10.01 to$25.00, **ADD** $3.50
$25.01 and over, **ADD** $5.00

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

LIFETIME LICENSES AND LIFETIME MAGAZINE SUBSCRIPTIONS

ENDOW 98

Complete and return entire page with proper payment (or credit card information). Our mailing address is: Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Office is located at 322 Chapanoke Rd., Raleigh, N.C. 27603. Telephone (919) 662-4377. Please make checks payable to the Wildlife Endowment Fund. $20.00 service charge for returned checks (N.C.G.S.25-3-512).

	PRICE
☐ Lifetime Comprehensive Fishing (residents only) (includes basic fish, trout and trout waters on game lands)	$250.00
☐ Lifetime Subscription to *Wildlife in North Carolina* magazine	$100.00

Infant and Youth Licenses:

☐ Lifetime Sportsman Infant (under 1 year of age) (Application must be received before one year of age) $200.00
☐ Personalized Lifetime Sportsman Infant (under 1 year of age) (Application must be received before one year of age) $205.00
☐ Lifetime Sportsman Youth (age 1 through 11) (Application must be received before 12 years of age) $350.00
☐ Personalized Lifetime Sportsman Youth (age 1 through 11) (Application must be received before 12 years of age) $355.00

A copy of a certified birth certificate (or the mother's copy) must accompany applications for sportsman's licenses for infants and youths.
Please note: Hospital copies will not be accepted. Also, birth certificates cannot be returned.

Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult at least 21 years of age, who is properly licensed to hunt in North Carolina. "Accompanied" is defined as being able to take immediate control of the hunting device.

☐ Lifetime Sportsman (residents only) (age 12 or older) (includes basic hunt and fish, big game, game lands, primitive weapons, trout, N.C. waterfowl [Federal waterfowl stamp is mandatory and must be purchased separately.]) $500.00
☐ Personalized Lifetime Sportsman (residents only) (age 12 or older) $505.00
☐ Lifetime Nonresident Sportsman (age 12 or older) (includes basic hunt and fish, big game, game lands, primitive weapons, trout, N.C. waterfowl [Federal waterfowl stamp is mandatory and must be purchased separately.]) $1,000.00
☐ Lifetime Comprehensive Hunting (residents only) (includes basic hunt, big game, game lands, primitive weapons) $250.00

On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or making out a written statement that he had such a license.

Check appropriate block and attach required copy

☐ Copy of Prior Year Hunting License ☐ Copy of Hunter Safety Certificate of Competence
☐ In lieu of copy, I am completing a written statement (complete below).

STATEMENT: I CERTIFY THAT I WAS A LICENSED HUNTER PRIOR TO JULY 1, 1991.

Date _____ Signature of Applicant _____

PLEASE TYPE OR PRINT LEGIBLY

Applicant Name: _____ (First) (Middle) (Last)

Address: _____ (Street/R.F.D.) (City) (State) (Zip)

Date of Birth _____ (Month/Day/Year) Social Security No.: _____ Driver's License No.: _____

Male: ☐ Female: ☐ Telephone Number: (____) _____ County _____

_____ Date _____ *Applicant or Donor Signature

If a personalized lifetime sportsman's license is being ordered, please indicate your selection of letters, numbers, dashes, periods, commas and/or blanks. Only six spaces may be used.

____ ____ ____ ____ ____ ____

The personal message for the personalized sportsman's license may include up to 21 spaces, including letters, numbers, dashes, periods, commas and/or blanks. Please write in your message as you wish it to appear.

Donor's Name and Address (if applicable)

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_____

I wish to make a tax-deductible contribution to the Wildlife Endowment Fund. Enclosed is a check for $ _____. Please make checks payable to the Wildlife Endowment Fund.

N.C. Wildlife Resources Commission Merchant #8430 0755 0
To charge your purchase to your VISA or MasterCard you MUST complete the form below (donations cannot be charged).
Card Holder's Name and Address (Please Print)

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☐ VISA ☐ MasterCard
Expires____/ ____ Acct. No. _____
Card Holder's Signature _____

MasterCard

VISA

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_____

Lifetime License $ _____

Lifetime Magazine $ _____

Total Charge $ _____

Authorization Code Number

_____

Wildlife Commission **Spotlight**

On the Mend

KEN TAYLOR

Lend your support to the Nongame and Endangered Wildlife Fund through a tax-deductible contribution on your North Carolina income tax form.

STEVE MASLOWSKI

The successful efforts to restore nesting populations of bald eagles to North Carolina (see p. 4) were supported by taxpayer contributions to the Tax Check-Off for Nongame and Endangered Wildlife. But that's just one of the programs that your donation helps to sustain. Here are some others:

Peregrine Falcon Restoration

Between 1984 and 1996, 88 peregrines were released from various cliff sites in western North Carolina by the N.C. Wildlife Resources Commission. Nongame biologists coordinate and conduct a nest-monitoring project that tracks the success of restoration efforts.

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Mussels are one of the best indicators of water quality, but more than 50 percent of mussels in North Carolina's waterways are considered imperiled. Nongame biologists monitor mussel populations (above left) and coordinate with state, federal and private agencies to protect their habitat.

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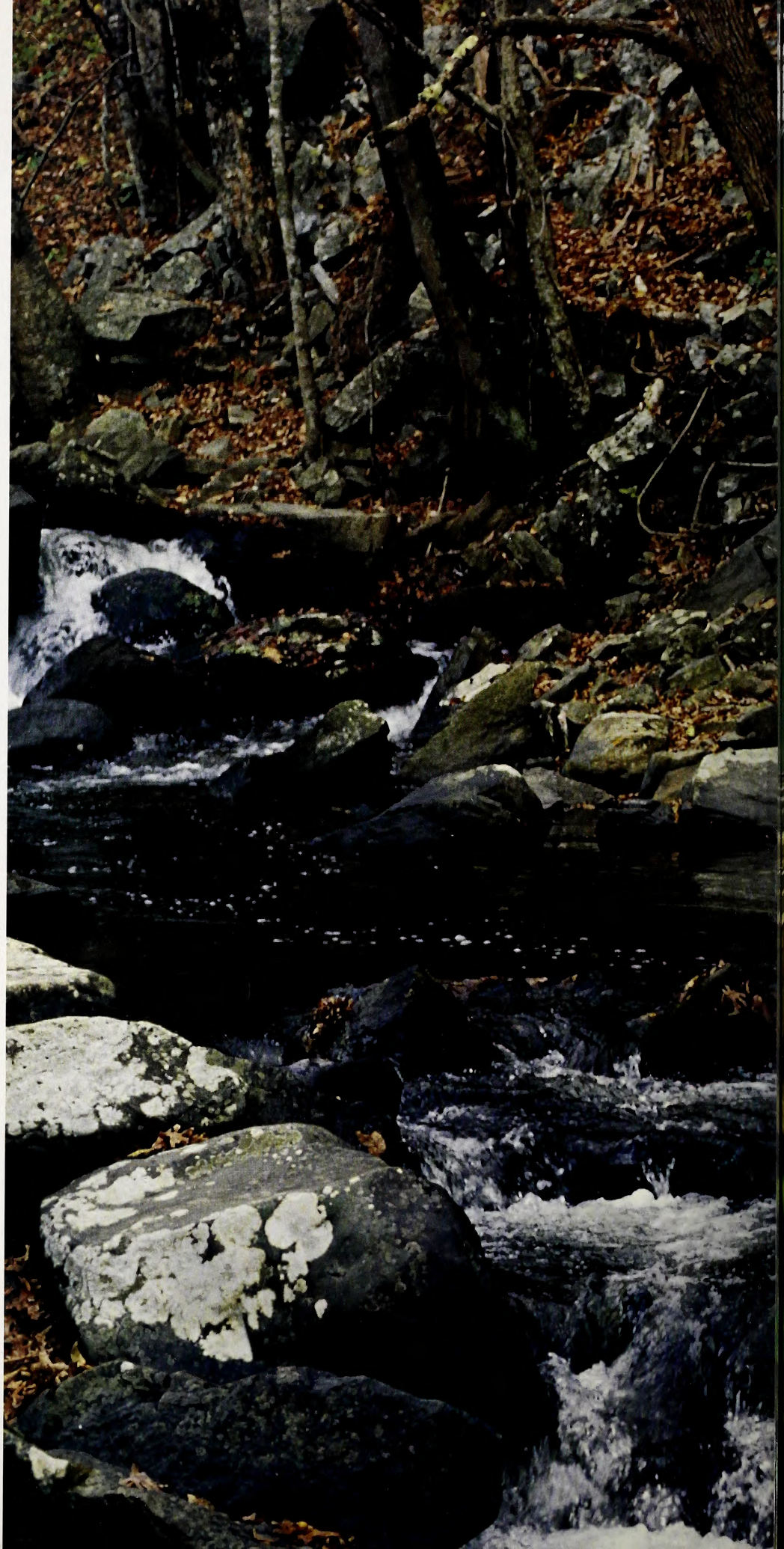

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Get a head start on Opening Day and take your flyrod to a lonely stretch of mountain trout water. For more on trout, turn to page 10.

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WILDLIFE IN NORTH CAROLINA

APRIL 1998 $1.50

The Laughing Place

by Jim Dean ©1998

"I don't know exactly what happened," my old friend told me. "It just wasn't the same anymore. Somehow, I got burned out."

"But that was years ago," I said. "Don't you ever get the urge to go again?"

He shrugged his shoulders. Here was a person who had once confessed that he loved fishing so much that he had been unable to sleep the night before a trip. In fact, fly fishing for trout had become such an obsession that he had gone out West after college and gotten a job as a guide. After two years fishing such storied streams as the Madison, Henrys Fork and Big Horn, he quit and came home—gave away his tackle and hasn't wet a line since.

JIM DEAN

"I got too close to it, I guess," he said. "After taking people fishing from dawn to dark every day through two seasons, not to mention fishing for my own pleasure every spare moment, I realized that I no longer looked forward to it. Came to almost dread it, in fact. I know it sounds odd."

Maybe it doesn't. Over the years, I have known others who bellied up too close to the fire and stayed there too long. I've had similar feelings about some of my life-long passions. Part of it must inevitably come with the passing years, a maturity—if you can call it that—that tempers youthful enthusiasm. And yet, I know older people who have managed to nurture an interest throughout their lives. How do they do it? One of them once told me that the secret is to hold the things you love at arm's length. "Sip, don't gulp," he said. "That's the way to keep your hobbies always fresh."

That advice seems to apply to places, too. Thirty years ago, I had a near desperate desire to live within sight of a trout stream. Or to have a place at the beach where I could walk out to the end of my pier, get into one of several boats—while you're dreaming, you might as well dream big—and fish to my heart's delight. Or maybe I could be happy living on a lake, or on a farm surrounded by good ponds. I never really could decide which appealed most.

"Is it our nature to embrace obsessions so heartily that we crush them beyond recognition?"

In the intervening years, I have managed to gain access to some of those places, at least on a modest basis. I bought a few remote acres on a small trout stream in the mountains and rented a tiny cabin nearby. I fixed up an old tenant shack at the family farm and worked on the irrigation ponds to improve the fishing. The opportunity to live at the beach is now available to me if I want it, but I haven't moved permanently to any of these places. I'm not sure I will. It's ironic, but I care too much about them.

I think of what Uncle Remus said while relating his tales of Bre'r Rabbit. "Everybody's gotta have a laughing place," he said. He understood quite well that everyone sometimes needs an escape, but you can't escape to a place if you already live there.

Once, some years ago while driving up the dirt logging road to my mountain cabin after an absence of some months, I realized that if I lived there, a time would surely come when it would no longer be a thrill to leisurely drive up that creek and see the tumbling rapids or admire the foliage turning amber after autumn's first cool snap. Instead, I would hurry along that all-too-familiar route, eyes straight ahead, thinking of chores or complaining about the washboard ruts. All that beauty and opportunity might easily become too familiar. With a stream at your doorstep, its pleasures are so accessible that it's too easy to put them off until tomorrow, or next week. Then, one day you realize you haven't fished in months, years. Is it our nature to embrace obsessions so heartily that we crush them beyond recognition?

Visiting your laughing place should be an adventure. You anticipate, choose your companions, pack up the gear and head out on the road. Or you do it all on the spur of the moment.

"I'll bet you'd enjoy going again," I told my friend. "You know, just a little sip. Enough time has passed."

"Well, if you want to show me one of your laughing places this spring, maybe I'll go with you," my friend said. "At least I wouldn't have to guide."

"I know a spot," I said. "You might even catch a few bass, and if you're having fun, I promise we'll quit while we're ahead."

"You mean you'd leave while they're still biting?" he asked.

Some folks never learn.

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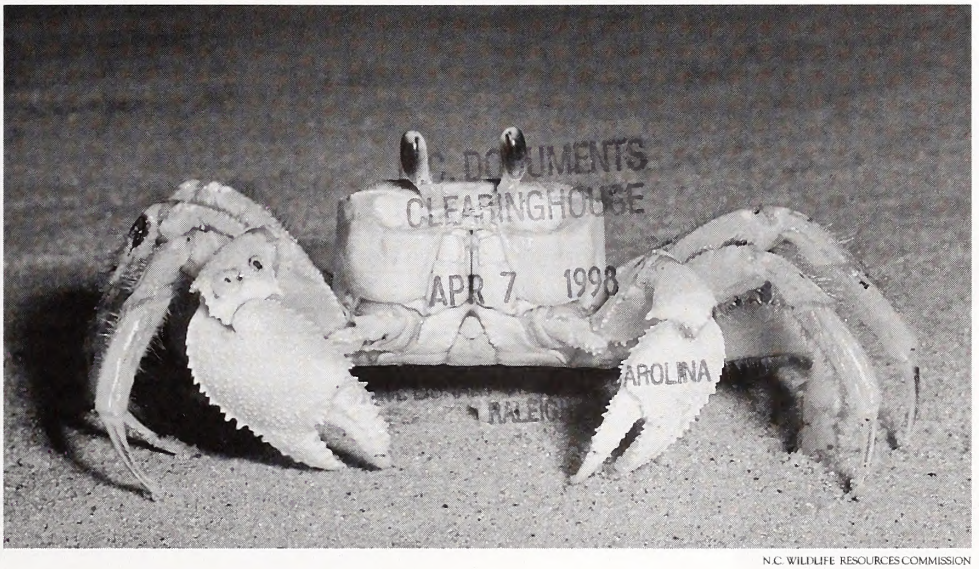

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Fact: *With its jointed legs, the ghost crab can move backwards, forwards and sideways on sandy beaches. It feeds on sea turtle eggs, coquinas and mole crabs and it digs burrows in which it hides its prey.*

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Contents

Wildlife in North Carolina

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and also to the environment we share with them.

April 1998 *Volume 62, Number 4*

Features

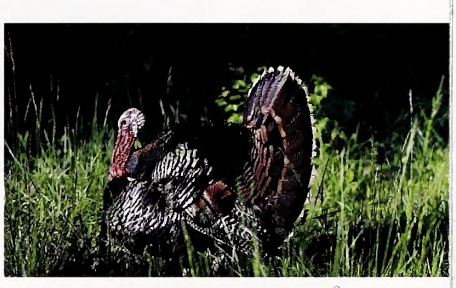
4 **Carolina's Toothy Trophies** *written by Bryan Hendricks* ©1998
color illustrations by Chris Armstrong ©1998
Muskie fishing in the South? You bet! Mile for mile, the muskie waters of our mountain lakes and rivers rival the best of what the north country has to offer.

8 **A Dizzy Climb for the Wild Turkey** *written by Jeff Samsel* ©1998
On the ropes just a few decades ago, the wild turkey has returned to North Carolina's forests in numbers little short of dramatic. Restoration efforts may soon no longer be needed.

12 **God's Ponds** *written by Jeff Beane* ©1998
photographed by Ken Taylor
Scientists have argued for decades over how our Carolina bays were formed. Today they're more interested in what's growing in these oval-shaped depressions—whole communities of rare plants and animals.

18 **The Lady Wears Camo** *written by Darcia Bondurant* ©1998
photographed by Ken Taylor
The fairer sex? Of course, but that doesn't mean women also can't be competent with shotguns, flyrods or motorboats. That's the message women of all ages are learning in Becoming an Outdoors Woman workshops.

22 **Farming's Quiet Revolution** *written by Carl Betsill*
photographed by Ken Taylor
With no-till cultivation, Halifax County farmers produce healthy crops while protecting their soil against erosion. Best of all, these "ugly" fields offer plenty of food and cover to small game.



page 8

page 12

page 18

Departments

Our Natural Heritage *by Jim Dean* ©1998 ..... **inside cover**
Nature's Ways *by Jeff Beane* ©1998 2
N.C. WILD Notebook *by Consie Powell* ©1998 28
Back Porch *by Rodney Foushee* 32
Wildlife Through the Year *by Rodney Foushee* 36
Cover *The great blue heron stalks the edges of Carolina bays, taking its harvest of aquatic creatures. Photograph by William S. Lea.* ©1998

page 28

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Rattlesnake Tails

written by Jeff Beane
illustrated by David Williams

When the first Europeans arrived in the New World, they encountered many creatures that were strange and wondrous to them, among them a snake with a bell on its tail. Such a beast seemed fabulous enough to have crawled straight out of a fairy tale, so it is little wonder that some fanciful myths were spun around the rattlesnake and its rattle. These included the notion that the rattle contained venom (or in some versions, a poisonous dust that could cause blindness); that rattlesnakes used their rattles to "sing" for a mate; and that the age of a rattlesnake could be determined by counting the segments in its rattle.

A rattlesnake's rattle, of course, contains no poison of any kind. It actually consists of modified epidermal scutes—dry, hollow, overlapping segments composed of keratin, the same material comprising our own fingernails.

As far as singing for a mate is concerned, rattlesnakes do not use their rattles for communicating with each other. Like all snakes, they lack external ear openings and are deaf to most airborne sounds. A rattlesnake probably cannot even hear its own rattle.

And you can't count rattle segments to age a rattlesnake, either. It's true that each time a rattlesnake sheds the outer layer of its skin, a new segment is added to the base of the rattle. But a young snake normally sheds as many as three or four times during its first year, and as many as five or six times. Older snakes grow more slowly and shed less often, perhaps once or twice a year. An old snake faced with a short growing season could go for over a year without shedding.

Furthermore, rattles are fragile and segments break off easily. If a snake's rattle is complete and unbroken, the number of segments indicate the number of times it has shed—not how many years old it is. An accurate estimate of a snake's age—especially a younger snake—may be determined by an expert familiar with a particular population.

Rattlesnakes aren't the only snakes to vibrate their tails when alarmed. Such behavior may serve to frighten potential predators or at least direct their attention toward the snake's tail—its most expendable part. The sound of any snake's tail vibrating in dry leaves can be rather startling, but rattlesnakes are masters of the art. They even have special tail-shaking muscles, which is easy to believe if you've ever tried to shake a rattle fast enough to produce the same resonant buzz a snake does.

The rattle's real purpose may be as a food-getting device. Many pit vipers practice what is known as "caudal luring"—they lie still and wiggle or flick their tail tip, which a frog, lizard or mouse will hopefully mistake for a tasty worm or insect and venture within striking range. Juvenile copperheads and cottonmouths use their bright yellow tails for this activity. The addition of a segmented tail tip may have enhanced the ruse's effectiveness. The two most primitive living rattlesnakes—the pigmy rattler and the massasauga—have rather small rattles and are known to practice caudal luring. The pigmy's tiny rattle is barely audible.

It is believed that as rattlesnake species developed in the open country that is now Mexico and the southwestern United States, the rattle developed into more of a warning device that helped the snakes avoid being accidentally trampled by large grazing mammals. Potential predators also learned to avoid the sound—so well that some other animals, including gopher snakes and burrowing owls, developed a defensive hiss that sounds remarkably like a rattle.

But when humans invaded rattlesnake country, the snakes' protective buzzers began to work against them, for these new large mammals were not content with mere avoidance, but insisted upon aggressive persecution. Of North Carolina's three rattlesnakes, the eastern diamondback is now extremely rare and the pigmy is uncommon. Both are protected by state law. The more widespread timber rattlesnake is also rapidly declining and has been eliminated from much of its former range. Several states list it as endangered or threatened.

This is particularly tragic to those of us who know what rattlesnakes really want—to be left alone, and what they really deserve—our respect and appreciation.

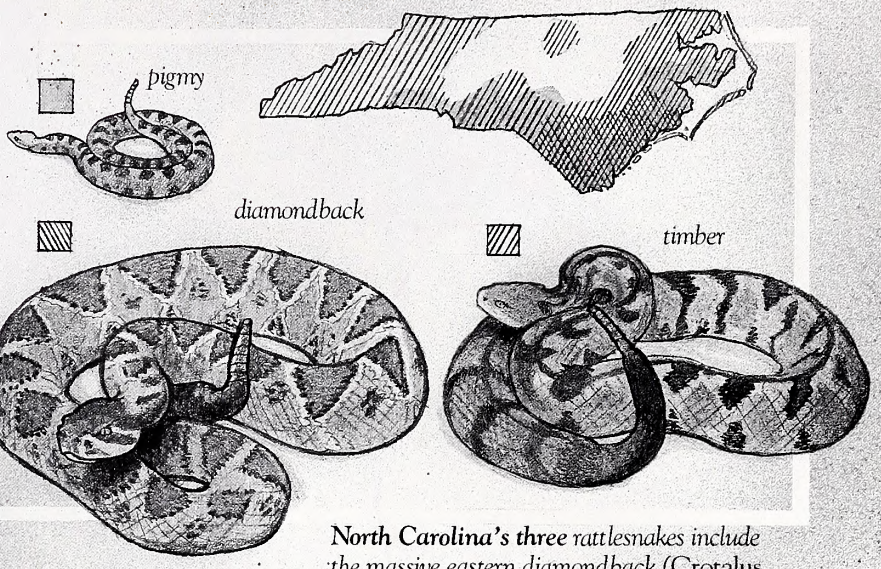
Other Reading

- William S. Brown, "Hidden Life of the Timber Rattler," *National Geographic*, v. 172 (1), 1987.
- Carl H. Ernst, *Venomous Reptiles of North America* (Smithsonian Institution Press, 1992).
- Laurence M. Klauber, *Rattlesnakes: Their Habits, Life Histories, and Influence on Mankind, 2nd Edition, two volumes* (University of California Press, Berkeley, 1972).

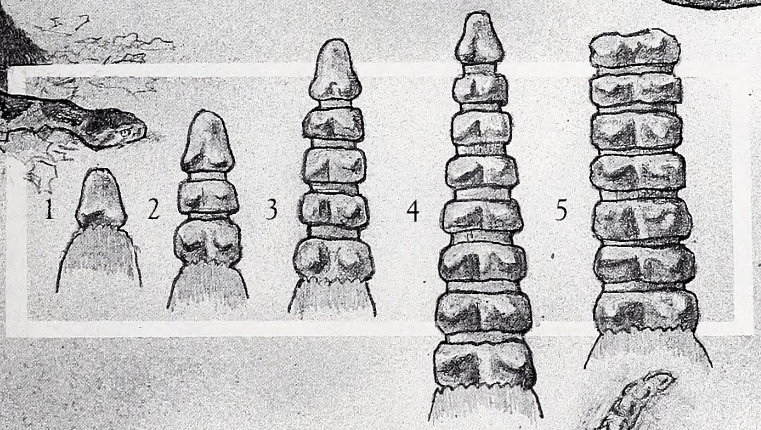
Surfing the Web

- The Laurence Monroe Klauber Memorial Rattlesnake Homepage includes a variety of information on rattlesnakes. *Address:* http://www.seeport.com/staff/dallett/klauber/klauber.htm
- Stetson University maintains an excellent web page on pigmy rattlesnakes. *Address:* http://www.stetson.edu/departments/biology/pigpage.html
- Visit this web site to hear a recording of a diamondback's rattle. *Address:* http://www.lsjunction.com/images/rattler.htm

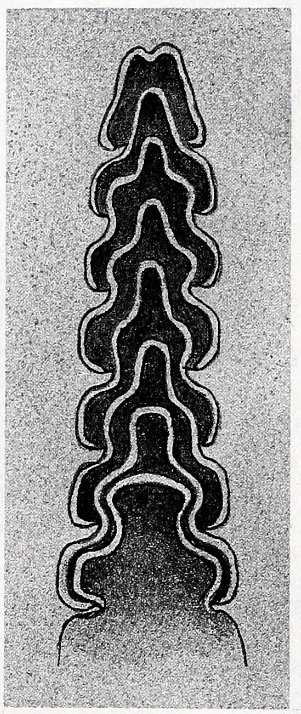
Each time a rattlesnake *sheds its skin, a new segment is exposed at the base of its rattle. Young snakes (which may shed several times a year) have a tapered rattle (1-4) with the original "button" at the tip. Segments break off easily, and as an older snake loses them, its rattle becomes more uniform in width (5).*



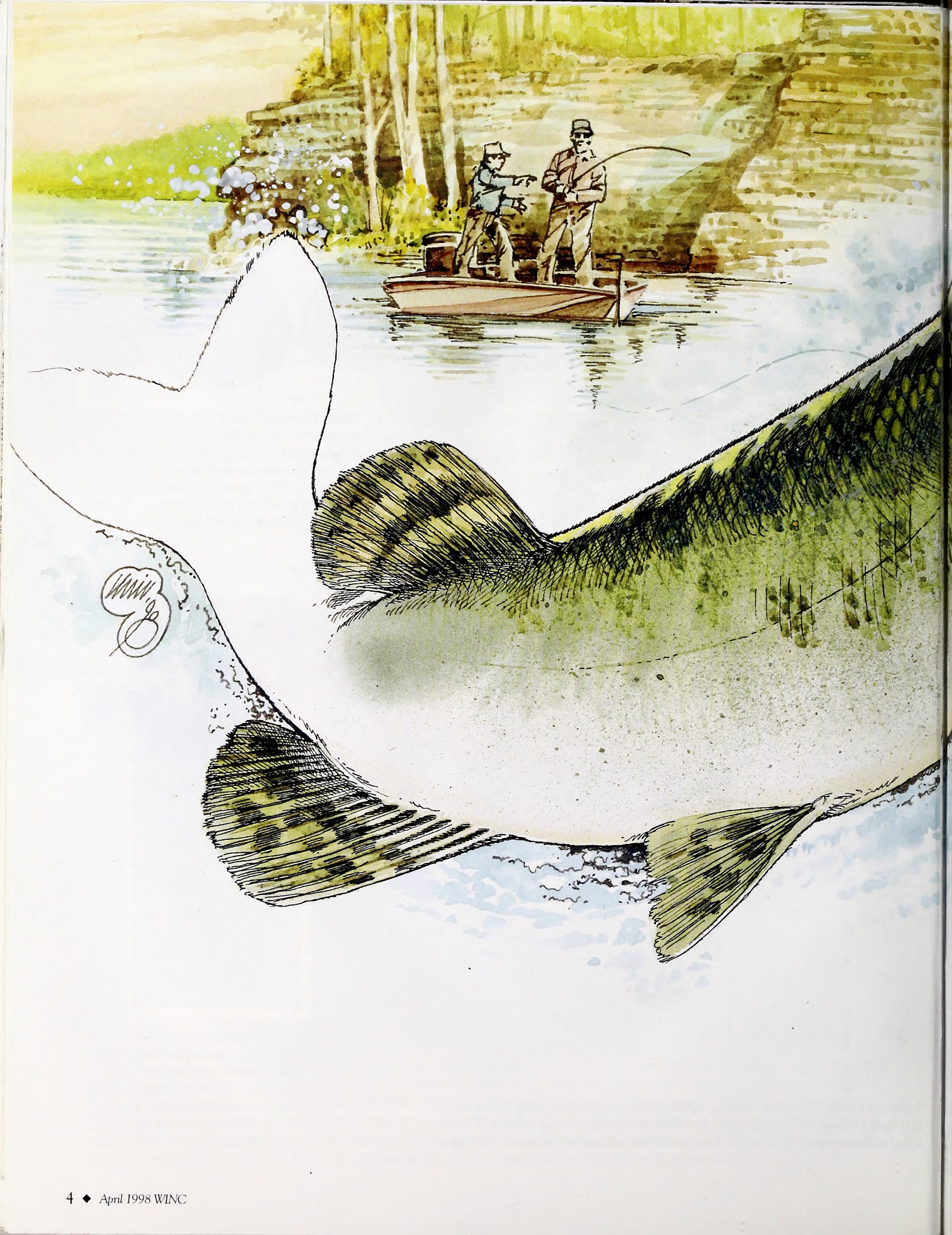
North Carolina's three *rattlesnakes include the massive eastern diamondback* (Crotalus adamanteus), *the tiny pigmy* (Sistrurus miliarius), *and the more familiar and widespread timber (often called "canebrake" in the Coastal Plain) rattlesnake* (Crotalus horridus). *All three suffer from habitat loss and human persecution.*

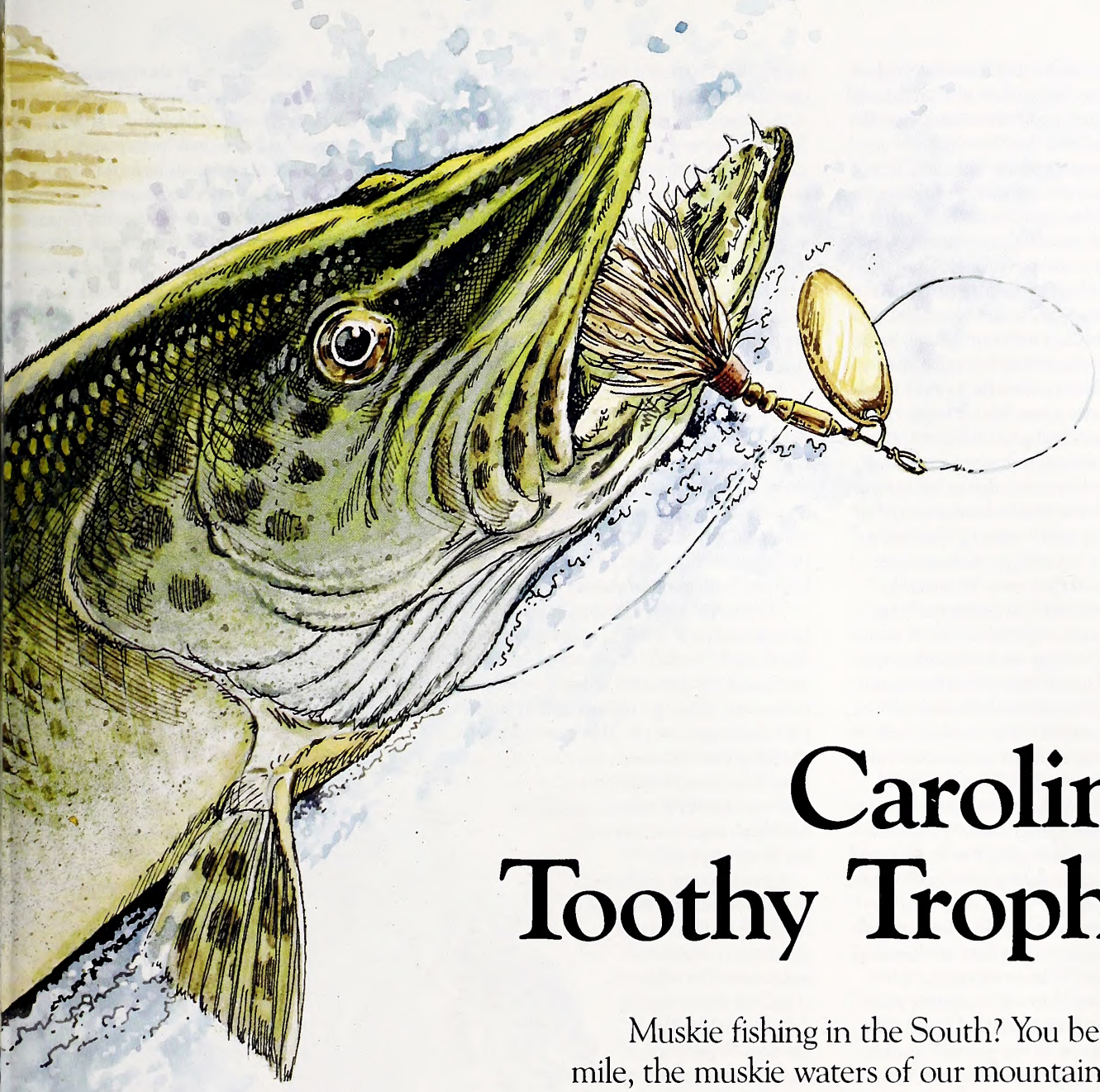


Most rattlesnakes use their rattle *as a defensive warning, but the pigmy rattlesnake's tiny rattle produces only a faint sound. Pigmies sometimes flick or twitch their tails to lure a frog or lizard within striking range. Their small rattle may enhance the lure's effectiveness.*



Rattle in *cross-section showing interlocking segments, each hanging loosely on the one preceding it. Specialized tail-shaker muscles vibrate the segments at about 55 cycles per second, producing the characteristic buzz.*





Carolina's Toothy Trophies

Muskie fishing in the South? You bet! Mile for mile, the muskie waters of our mountain lakes and rivers rival the best of what the north country has to offer.

written by Bryan Hendricks ©1998 / color illustrations by Chris Armstrong ©1998

When you fish the French Broad River, catching a muskie is your first mistake. Your second mistake may be trying to catch another one.

It's true that many folks who tangle with muskies in North Carolina hook up while fishing for something else, usually smallmouth bass or walleye. However, there's no escaping the thrill that comes from fighting a fish as large and as mean as a muskie, and to some it becomes an obsession.

You may never catch another muskie, but western North Carolina is a great place to try. In contrast to the highly publicized muskie fishing in the Great Lakes states, the muskie waters of the South are among the nation's best-kept secrets. North Carolina has six first-rate fisheries of its own, including the French Broad, New and Nolichucky rivers, as well as lakes James, Adger (Polk County) and Fontana. In fact, Fontana yielded a 41-pound muskie to Chancey Jones Jr. in 1994, that captured the state record. That's a big muskie, even by Wisconsin standards!

Originally, the muskellunge was native to North Carolina in the streams and rivers of the Mississippi River drainage, but siltation and industrial pollution wiped the species out by the 1960s. Since the infertile waters in the western part of the state lacked a significant predator to balance the food chain, biologists with the N.C. Wildlife Resources Commission decided that muskies could fill a niche in areas where trophy fisheries didn't exist. The Commission began stocking them in 1970, and the waters still in the program are stocked in even years with 160 to 250 fish ranging in size from 10 to 12 inches. Lake James got an accidental but immediate trophy muskie fishery in 1977 when a flood washed the brood stock from a nearby hatchery into a tributary of the Catawba River.

Mickey Clemmons, the Wildlife Commission's District 9 fisheries biologist, said muskie management assumes a low profile in

his area, but not for lack of interest. Anglers are fascinated by the muskies in Fontana and the French Broad, and they come from all over the Southeast to try their luck.

"One of the goals of the Wildlife Commission is to provide a diversity of fishing experiences," Clemmons said. "From that standpoint, the muskie offers a unique fishing opportunity in western North Carolina. The economic benefits that are generated from muskie fishing are relatively small compared to bass fishing and trout fishing, but it does provide a trophy fishery in a body of water that wouldn't otherwise support much.

"Even with the game fish we have," he added, "we're not going to be able to offer a bass or walleye fishery that gives somebody the opportunity to catch a fish as big as their children. This is the southernmost extent of muskie range, so we're offering that possibility for anglers in Georgia, Alabama and South Carolina, if they want to come up."

Despite the muskie's sporting qualities, local anglers initially resisted the fish's return for fear it would ravage more valuable populations of smallmouth bass and other game fish. Those fears have never been fully allayed, but there's no evidence that muskies have damaged other sport fisheries. On the contrary, they've proven valuable in their limited territories by thinning out overpopulations of so-called "rough fish." As proof, Clemmons pointed out that the state-record muskie had a 5-pound carp in its belly when Chancey Jones caught it.

"Shortly after we started stocking, people started complaining, saying that muskies were eating game fish," Clemmons said. "Most of the waters they're in will have a lot more nongame fish such as suckers and carp. The French Broad is one of the primary muskie fisheries, and it's just full of redhorse suckers. There are just so many in there that, on a chance basis, muskies are going to run into them more often than they'll run into a game fish, so that's what they're going to eat more often than not."

In places like the Tuckasegee and Little Tennessee rivers, where game fish predation was an overriding concern, the Wildlife Commission quit stocking muskies years ago. The window was open just long enough for them to establish a finhold, and now they reproduce naturally in some of those waters. That's why Fontana's muskies are so big. They've been there a long time, and they have an easy life in the still waters of the lake, where they don't constantly have to fight swift current.

In the rivers, ironically, North Carolina's muskies thrive in the same sort of conditions that doomed them decades ago. Nutrients from runoff, sewage and industrial discharges continually fertilize rivers like the French Broad, fueling the growth of aquatic vegetation, phytoplankton and algae. Rough fish eat the vegetation, and, in turn, they provide a high-fat, high-protein diet for the muskies.

"Western North Carolina is known for having relatively nutrient-poor water, and the French Broad is the same way," Clemmons said. "It gets a lot of input from sewer plants, and there's a paper plant in Brevard that discharges into it. There are a lot of discharges up and down the river that act as artificial nutrient sources, and that's prob-ably the basis for having so many suckers and herbivore-type fish."

Compared to the French Broad, the muskie fisheries of the New and Nolichucky rivers are relatively unknown. The Nolichucky is overlooked for trophy fish, but the New River is a legitimate hot spot. Like its sister to the southwest, it's loaded with suckers, carp and shiners. It also has great scenery, big muskies and relatively little pressure.

"We have them in Allegheny and Ashe counties, and they've done pretty well," said Joe Mickey, former fisheries biologist for District 7. "We haven't done any surveys in the river, but we think we may have a little natural reproduction. We did some work years ago, when we had a pretty active muskie club, and they'd send us scales from the fish they caught. Some of those (scales) indicated they came from fish we did not stock."

"That makes us feel good," he added. "We want it to be self-sustaining."

Ultimately, the success of the program requires ongoing interest from sportsmen, and there is no doubt that muskies are increasingly popular among Tar Heel anglers. The

***Muskies like to** ambush prey from deep holes filled with logjams and woody debris. Anglers fish for muskie where still pools form below deep banks, or where eddies are associated with tributary streams.*

most conspicuous advocates of the program are the members of the Western North Carolina Muskie Club. Don Funderud of Asheville, president of the club, said the group originally formed as an auxiliary unit to help the Wildlife Commission stock and study the fish. Working closely with the agency's fisheries biologists and technicians, these anglers learned about muskies by watching and then applied their knowledge to catching.

"When the Western North Carolina Muskie Club started in 1981, a group of guys got together, like a bass club, to form an organization that wanted to help with the resurgence of the muskie program," Funderud said. "Anytime the Commission needed help with stocking or needed help with projects, our club did fund-raisers and provided manpower and whatever resources we could. When wading birds were eating fish at the hatchery, we bought lumber and netting to help build screens over the ponds. And we helped buy thermometers and food for the hatchery.

"Whenever they needed financial aid, we'd do our best to help them," he added. "Whenever they needed manpower, we provided boats and manpower."

Eventually, anglers like Funderud learned that muskies aren't as mysterious as legend makes them out to be. Catching them requires patience and effort, but once you learn the basics, making "second mistakes" becomes a little easier.

"They're a tough fish to catch," Funderud said, "but the more you go, the more you'll catch them. You hunt them like deer. You've got to look for them, and once you find them, you've got to get the proper lure and the proper presentation."

The key to finding muskies is being able to identify muskie habitat. In the rivers, they inhabit deep holes littered with logjams, stumps and other woody debris. These types of structures serve as lairs and ambush points from which they can spring upon an unsuspecting victim and then dash back to safety.

Current is also important. If you find a hole near a tributary with a couple of good eddies, you know you're in the right place. "A good situation would be where you've got a still pool that backs up under deep banks, and you've got the creek feeding in," Funderud said. "Sometimes there's still water on the lower end."

Once you find the right spot, you must determine the mood of the fish. Sometimes they're aggressive, and sometimes they're reticent. Sometimes they're somewhere in between. "It depends on the situation," Funderud said. "A lot of times they'll hit right at the bank when you make a cast, but sometimes they'll pick up and follow your lure right to the boat. As you lift out, they'll coil up and take it coming out of the water. If you're not watching, you'll lift up, and there'll be a big explosion in your face."

Because of their size and fury, muskies require heavy-duty tackle similar to what you'd use for stripers or for largemouth bass in heavy cover. Funderud uses a muskie rod, 6 feet or longer, with a high-capacity bait-casting reel spooled with 20-pound test line. In the French Broad, where the water is murky, you can also use a wire leader.

For lures, Funderud relies primarily on unweighted green bucktails with inline spinners and magnum-size stickbaits. He starts with the bucktail. If a fish follows it but won't hit, he'll experiment with plugs. The key is to keep the lure moving.

"That's why I use bait-cast reels instead of spinning reels," Funderud said. "As soon as the bucktail hits the water, I get it spinning right below the surface and make a splash with a left or right movement.

"Sometimes they don't like it and they'll break off," he added. "Then you switch to a plug or a different color bucktail."

Funderud said the best way to work a hole when approaching from upriver is for two anglers to fan-cast perpendicular to the eddy. The man in front has a 90-degree casting territory from the bow to amidships. The man in back has 90 degrees from amidships to stern. That way, if one angler gets a "follow," the other one may get the strike.

Another method Funderud uses to catch finicky muskies is an old bass tactic called "skittering." If a fish continually follows a lure but won't hit it, you can skitter the bucktail through the water in a figure eight pattern with your rod tip.

"It works," Funderud said. "They'll coil up on it and eat it up."

If you intend to keep a muskie, remember that the minimum-length limit is 30 inches. If you release a fish, it's important to handle it properly and as little as possible. Wet your hands before touching the fish to protect its slime layer. Instead of removing the hook, use side cutters to snip the hook at the eyelet. Don't hold a muskie up by the jaws because it puts too much stress on its internal organs.

Before releasing a fish, gently place it in the water, grasp the tail and cradle the belly, and move it slowly back and forth to revive it. Once it recovers, it'll swim away. As you watch it disappear, you'll realize that this adventure was no mistake at all. ⊠

A Dizzy Climb

N.C. WILDLIFE RESOURCES COMMISSION

FOR THE Wild Turkey

On the ropes just a few decades ago, the wild turkey has returned to North Carolina's forests in numbers little short of dramatic. Restoration efforts may soon no longer be needed.

written by Jeff Samsel ©1998

Beating broad wings, 14 wild turkeys found freedom in the air. Like more than 3,500 birds before them on sites across the state, these newcomers to the area would soon find their niche in the local habitat. Such releases have taken place hundreds of times over the past three decades and have made up the thrust of North Carolina's Wild Turkey Project. This day was far from typical, however, as more than 100 onlookers watched the release, with many taking photos of the big birds taking wing.

The January event in a Gaston County field represented the culmination of restocking efforts in the western third of North Carolina. With western efforts wrapped up, it also pointed toward an end for statewide turkey restoration. By the year 2000 all restocking should be completed, according to Mike Seamster, Wild Turkey Project leader for the N.C. Wildlife Resources Commission.

As last year brought completion to western restocking efforts, this year will see yet another milestone passed—an end to any need for the acquisition of turkeys from sources outside the state. About half the birds relocated during the 1990s have come from other states' populations, but Seamster anticipates being able to trap sufficient numbers of homegrown birds after this year to complete restoration efforts.

The restoration project has been such a major part of the state's wild turkey program over the past several years that some observers have joked with Seamster that he might have done too fine a job and stocked himself right out of a job. In truth, however, completion of restoration will free up both time and money to develop other important aspects of North Carolina's Wild Turkey Project.

"We continue to have restoration as our major focus," Seamster said, "but with the west completed and the rest of the state within a few years of being finished, we will have more time to look at other areas."

With each site completed, Seamster and other biologists gain additional resources for managing both the turkey population that they have worked so long to rebuild and habitat for those birds. Time previously spent moving birds into available habitat will be spent in the field with the men and women who make the decisions affecting the turkeys' habitat.

While scattered bits of habitat management work have been carried out in recent years, devoting significant resources to such projects with restoration still incomplete would have been premature. Time and money spent tweaking habitat on a specific site might have been better spent moving turkeys into other areas where suitable habitat already existed.

As those incomplete restoration sites become increasingly scarce, however, Seamster will be able to spend more time managing, instead of restoring, the turkey population. He will have time to meet with representatives from major timber companies, the U.S. Forest Service and the National Park Service, each of which controls huge tracts of land in North Carolina. Likewise, he will be more available to provide technical assistance to individual private landowners who want to manage their property to provide better habitat for wild turkeys.

"By being on a first-name basis with landowners, land managers, foresters and biologists across the state, we can have much more input on what happens on that land," Seamster said.

Throughout the eastern third of the state, a handful of timber companies control tremendous acreages of land. Pine plantations, which generally do not make prime turkey habitat, dominate these lands, but implementation of a few basic management steps could greatly increase the productivity of many eastern North Carolina tracts.

Simply retaining hardwood drains when trees are cut, for example, preserves segments of the mast-producing habitat, providing turkeys with valuable food sources. Prescribed burning likewise allows valuable early-succession natural food sources to grow, along with providing openings for turkeys.

Burning used to make up an important part of the management scheme on many eastern North Carolina properties, according to Seamster, but the amount of burning has declined in recent years, and that has had a detrimental effect on the turkey habitat.

Another simple step that provides great benefit to turkeys and many other wildlife species, and takes no property out of timber production, is to gate roads and seed them with grasses. This makes use of clearings that are already in place and produces a network of linear feeding areas.

"Many of these areas still may not be top-quality habitat," Seamster pointed out, "but they will support a good, huntable wild turkey population."

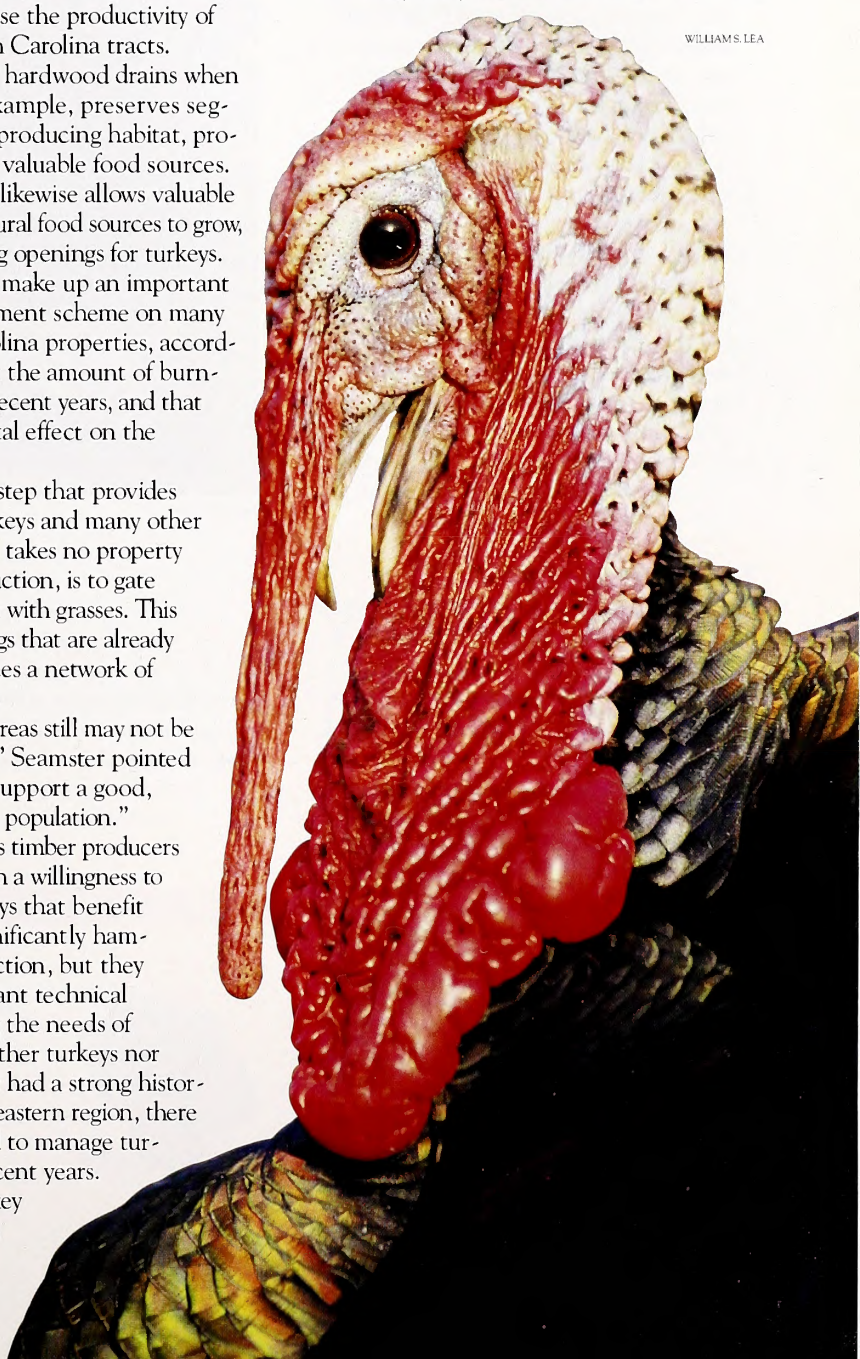
North Carolina' s timber producers have generally shown a willingness to manage lands in ways that benefit wildlife without significantly hampering wood production, but they have lacked significant technical assistance regarding the needs of wild turkeys. As neither turkeys nor turkey hunters have had a strong historical presence in the eastern region, there has been little need to manage turkey habitat until recent years.

Numbers of turkey hunters have grown rapidly with rebounding populations, however, and with those numbers has come the demand for management practices favoring wild turkeys. Seamster will help meet that demand as he goes to individual sites, evaluates the habitat and makes specific recommendations of steps that will create better habitat for the birds.

Through North Carolina's Piedmont, individuals, instead of corporations, own much of the rural land, generally in much smaller tracts. As many landowners either

***With turkey populations** fully restocked in the western portion of North Carolina, game biologists predict the eastern half of the state should no longer need replenishing by the year 2000. An indicator of the program's success is the likelihood that by next year biologists will rely solely on in-state birds for restocking.*

WILLIAM S. LEA



MELISSA McGAW

Mike Seamster, *Wild Turkey Project leader with the N.C. Wildlife Resources Commission, holds a female turkey while a band is attached by Sgt. Mitch Kuykendall, a wildlife enforcement officer. With turkey populations well on their way to recovery, Seamster plans to focus more attention on managing the population rather than rebuilding it.*

Wild Turkey Restoration

LLOYD B. HILL

Time line information collected by Ken Taylor.

1700-1800

Following settlement of this country, the wild turkey disappeared from large sections of its original range due to unrestricted hunting.

1880-1920

By the late 1800s and early 1900s the wild turkey had disappeared from many sections of North Carolina. This decline was due to habitat destruction from the clearing of forests.

NORTH CAROLINA TURKEY POPULATION ESTIMATES • 1946: 8,340 turkeys

1738

First game laws passed in North Carolina.

1800s

Market hunting era

1900

Lacey Act passed—the first federal law regulating interstate and international commerce in wildlife.

1937

Pittman-Robertson Act established funding for wildlife restoration and research activities.

hunt their property or lease hunting rights to clubs, much of this land has been managed for many years with wildlife (especially white-tailed deer) in mind. Again, the fervor for wild turkeys is relatively new in this region, so managing for them has not been a priority in the past.

Landowners who desire to improve their offerings for turkeys or other wildlife species often seek the assistance of Wildlife Commission biologists. While district biologists handle much of this burden, their time and expertise must be thinly spread to deal with an incredibly wide range of needs. It helps to have someone on hand who is experienced with a particular species, and though Mike Seamster simply has not had much time to devote to individual landowners' questions, he looks forward to seeing that situation change.

By far the largest owner of land in North Carolina is the U.S. Forest Service. The Nantahala, Pisgah, Uwharrie and Croatan national forests together cover more than 1 million acres. While Uwharrie is centered in the Piedmont and Croatan is tucked away in the coastal area, the western North Carolina mountains hold most of North Carolina's national forestland in the vast Nantahala and Pisgah national forests.

There wild turkeys enjoy plenty of mast, with forested land comprising 99 percent of the two national forests. Mountain populations are generally doing well, but the habitat is still less than perfect. Turkeys lack critical brood range in the west, Seamster said, but that can be created by seeding logging decks and forest service roads and by creating openings on national forestlands.

The Wildlife Commission already enjoys a good working relationship with the Forest Service, and the two agencies are at work on various cooperative projects to improve wildlife habitat. With increased time to look at specific national forest tracts and work with foresters and biologists, Seamster will be able to direct more of these efforts toward the wild turkeys' needs.

More time can also be devoted to personal involvement with state and local chapters of the National Wild Turkey Federation. Seamster will be able to spend more hours listening to and addressing the concerns of turkey hunters in North Carolina and to suggest projects that would offer the most benefit to local populations and habitats.

In addition to more time, Seamster anticipates gaining additional revenues to work with as restoration efforts are wrapped up. Relocating wild turkeys costs an average of $500 per bird, and the cost of acquiring out-of-state birds has totaled more than $800,000 since 1989. Though the cost has been shared by the Turkey Federation's Super Fund program, such spending has left almost no funds for developing other aspects of the Wild Turkey Project.

The Super Fund has provided $254,000 for acquiring out-of-state birds since 1989. As additional funds from the Super Fund and from the Commission's Wild Turkey Project budget come available, Seamster will be able to match dollars and initiate projects for North Carolina's four national forests. Through its Challenge Cost Share program, the Forest Service keeps funds available for habitat improvement projects where the dollars are matched by another agency or organization.

Typically, the Turkey Federation and the Forest Service cooperatively fund a project, while the Wildlife Commission offers expertise, equipment and manpower to carry out restoration efforts. The federation might add manpower as well, with volunteers from local chapters donating their time and sweat to help complete habitat improvement projects.

"As a wildlife resources agency, we first come into the mix by making recommendations on which projects would best benefit the wild turkeys," Seamster explained.

By cooperating with other government agencies, private landowners, corporations and conservation organizations, the Wildlife Commission dramatically increases its management resources. In upcoming years, Mike Seamster will be busy considering ways to improve turkey habitat statewide and manage the population, ever reevaluating the best uses of various resources.

The Wild Turkey Project's primary goal of restoring populations to available habitat has been most effectively met over the past 30 years through the single means of relocating birds. Managing a population that has been successfully reestablished, however, is a much more complex and dynamic process, and new priorities will develop as goals are met.

With a new harvest record expected this spring and 71 counties or parts of counties proposed to be open for hunting this season, North Carolina's turkey population is well on the way to being fully restored. With such success comes a changing set of challenges for the Wildlife Commission's Wild Turkey Project—challenges that Mike Seamster and other biologists stand ready to face. ⊠

1950-1970s

Early efforts at restoring wild turkey populations by releasing pen-reared or game farm birds failed miserably.

1970-1988

1,100 birds were live-trapped and relocated to some 60 different restoration areas in North Carolina.

1989-1997

Since 1989, 1,625 wild turkeys have been acquired from other states through the National Wild Turkey Federation's Super Fund Program to supplement in-state trapping efforts. Wild turkeys now exist in 99 of the state's 100 counties.

1964: 3,770 turkeys • 1970: 2,000 turkeys • 1980: 7,500 turkeys • 1990: 28,000 turkeys • 1995: 85,000 turkeys

1972

A moratorium placed on fall turkey hunting, a spring-only gobbler season and intensified restoration efforts marked the beginning of the wild turkey's comeback.

1997

Since 1970, 4,488 wild turkeys have been released on some 300 sites across the state. A total of 3,245 have been relocated since 1990.

God's ponds

Scientists have argued for decades over how our Carolina bays were formed. Today they're more interested in what's growing in these oval-shaped depressions—whole communities of rare plants and animals.

written by Jeff Beane ©1998
photographed by Ken Taylor

On the night of my 26th birthday, I crouched on my hands and knees in a Carolina bay in Scotland County. I was kneeling in shallow water, looking for an eastern narrowmouth toad concealed in the grass a few inches in front of my nose. My head rang from the din of dozens of other narrowmouth toads, squirrel tree frogs and pinewoods tree frogs that surrounded me. Although other herpetologists besides myself had visited the bay, they had never documented the existence of any of these common summer-breeding frogs. Such documentation meant collecting a specimen and depositing it in a curated collection, such as the one maintained by the N.C. State Museum of Natural Sciences, where I work.

***Though their origins** are still mysterious, all Carolina bays probably were formed in the same way. They can look very different from each other. Mottled with duckweed, spatterdock and other aquatic vegetation, Dunahoe Bay in Robeson County is flooded most months of the year.*

A lesser siren swam by, snakelike, and diverted my attention momentarily. As I again eased my hands into the submerged grasses in search of my targeted narrow-mouth, a juvenile banded water snake crawled between my fingers and, as I gently lifted it up, regurgitated a pinewoods tree frog in my hand (I've had better birthday gifts, but probably few that were more sincere). I never found the narrowmouth toad, but I did find a specimen of North America's smallest amphibian clinging to a stem directly in front of my face. It was a little grass frog, the first one that I could recall having actually seen in the wild, though I had often heard their tiny, insectlike trills. I heard none calling that night, yet I chanced across that one, which turned out to be another undocumented species for the site. In a Carolina bay, most anything can happen.

I had first visited a Carolina bay—the same Carolina bay, in fact—four years earlier when I was a student in a herpetology class. Known originally as Laurinburg Pond, it was later named Tunstall Bay by The Nature Conservancy, after Margaret Tunstall, who owned most of it. I have since

visited that site many times, each time finding something different, and each time being reminded of the wonder and mystery of these extraordinary ecosystems.

Carolina bays are elliptical depressions of unknown origin, occurring almost exclusively in the Coastal Plain of the Carolinas. Early settlers called them "bays" in reference to certain evergreen shrubs—including sweet bay (*Magnolia virginiana*) red bay (*Persea borbonia*) and loblolly bay (*Gordonia lasianthus*) —that grew around the margins of many of them. However, bays are not characterized by any particular type of vegetation. The terms "pocosin" (derived from an Algonquin word meaning "swamp on a hill") and "shrub bog," often used interchangeably, are both sometimes used to refer to Carolina bays, but most Carolina bays are actually neither.

These mysterious depressions differ greatly from one another, but all of them are interesting. They range in size from less than 50 meters to more than 5 miles across. Most hold water for at least part of a given year but dry up periodically. Some, however, are permanent lakes, like Lake Waccamaw in Columbus County, the largest known Carolina bay. Bays are usually oriented northwest to southeast, and in order to fully appreciate their strange shape and orientation, one should see them from the air or examine aerial photos or topographic maps (as examples, examine the United States Geological Survey topo quads for Rennert, Parkton, Saint Pauls, Raeford, Red Springs or Wagram). The larger "bay lakes" in Bladen County appear on the state highway map. Most bays are bordered by a "sand rim," which is usually more pronounced or noticeable along the southeastern margin but may span the entire perimeter.

Many theories have been proposed to explain the origin of Carolina bays, but none has been universally accepted. The most popular opinion favors wind and wave action, but another theory maintains that the bays were formed by ancient meteor showers. Other, more imaginative hypotheses include their formation by large schools of spawning fish, melting icebergs, antimatter collisions and even launch sites for alien spacecraft. I once heard someone jokingly refer to the bays as "refrigerator impact zones," in reference to the large numbers of discarded kitchen appliances that occur with remarkable consistency on many of the bays' sand rims.

Some bays—such as many of those on the property of the Savannah River Plant in Aiken and Barnwell counties, South Carolina —have been fairly well studied. Others have never been explored by biologists or geologists, and some smaller ones perhaps have not even been discovered yet.

I fell in love with all bays years ago, but my favorites are a complex of several open, grassy, clay-bottomed bays in Scotland, Robeson and Hoke counties. Also known as "cypress savannas," bays of this type were once far more numerous, but most have been destroyed by agriculture or other human activities. Several of the few that remain are now owned, at least in part, by The Nature Conservancy. Their names (at least to me) read like a list of sacred shrines: Pretty Pond, Antioch, Goose Pond, Tunstall, McIntosh, 401, Backside, Dunahoe, Hamby's, Oak Savanna. Each is unique in its own way, but all contain pond cypress (*Taxodium ascendens*) and a rich variety of grasses and other vegetation. Many harbor rare plants and invertebrates, and probably all contain the crayfish *Procambarus pearsei*, which I believe to be a "keystone" species—a species so important to an ecosystem that the system would collapse without it. During periods of drought, these crayfish maintain a subterranean aquatic existence, and their burrows appear to serve as vital refuges for numerous other bay inhabitants. Of particular interest to me is the fact that these grassy cypress bays, which are underlain by clay, dry up periodically. Thus they serve as important breeding sites for many amphibian species, especially the ones that cannot coexist with fish—species such as the eastern tiger salamander, Mabee's salamander, Carolina gopher frog and ornate chorus frog.

In a bay, something is always breeding if there is enough water. Frogs of one species or another can be heard during any month of the year, and sometimes their breeding choruses can be deafening. Some bays have 25 or more species of amphibians

***Horseshoe Lake, or** Suggs Mill Pond, in Bladen County is being acquired by the N.C. Wildlife Resources Commission as a game land. The most botanically diverse Carolina bays are underlain by clay soils that dry up periodically, creating wetland habitat for many plant and wildlife species, including birds such as the yellow-crowned night heron (right).*

utilizing them as breeding sites.

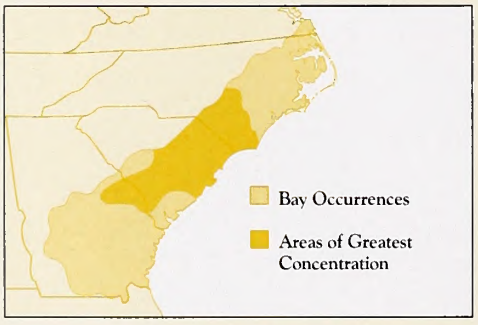
At least one amphibian seems almost exclusively limited—at least in North Carolina—to these open, grassy bays: the silverbelly form of the dwarf salamander (*Eurycea quadridigitata*). This tiny, slender salamander comes in two forms or color phases (there is evidence that the two are actually separate species). The yellowbelly form, which in North Carolina is the more common, is widely distributed throughout much of the Coastal Plain and lower Piedmont. The silverbelly form, though common in a variety of wetland habitats farther south, is a relatively rare animal in North Carolina, known only from five Coastal Plain counties. In 1990 it was listed by the state as a species of special concern. Most specimens have been taken in bays or very similar habitats. Silverbelly adults are terrestrial and are most often found under logs or other surface cover around the bay margins. The larvae are aquatic, but it is unclear where the animals lay their eggs. The yellowbelly form usually breeds in seepage areas and deposits its small egg clusters in sphagnum or other moss near the water's edge, but little or no such moss exists in most of the bays where the silverbellies occur. It is suspected that they may lay their eggs in crevices in cypress logs, but to my knowledge no one has ever found such a nest in North Carolina. To me, that is but one of many as-yet-unlocked secrets contributing to the overall bay mystique.

Another is the bay's hydrology, which is enough to confuse anyone. A bay may be dry, or nearly so, for several years, then hold water for several more years. It may remain dry after torrential rains that cause surrounding streams and ponds (and even other nearby bays) to flood, then later fill with water after only a moderate rain, when surrounding bodies of water may be even lower than normal. These widely fluctuating water tables prompted The Nature Conservancy to install wells in several of its bays to monitor water levels over time. Volunteers have taken periodic readings, and their data have been recorded and compiled for several years, but I am not certain anyone has been able to make complete sense of it.

When I walk or wade through a bay, the feeling of being in a unique and ancient place is difficult to ignore. It is like being in a cathedral, created ages ago by an all-but-forgotten power for some purpose far loftier

***Many of the seasonally** wet clay-based bays, such as Goose Pond in Robeson County, accommodate thriving forests of broad-bottomed pond cypress. In spring, flowering hatpins* (Eriocaulon sp.) *transform this bay into a natural garden.*

fence lizard



Range of Carolina bays

Visiting the Mysterious Bays

The Nature Conservancy

The Nature Conservancy, North Carolina Chapter, is offering a trip to McIntosh Bay Complex in Scotland County and Antioch Church Bay in Hoke County on July 18 from 9:30 a.m. to 1:30 p.m. The trip fee is $10 per adult, $5 per child under 12. To sign up, mail a check payable to TNC and a note indicating you are registering for the Carolina bays trip. Send both to The Nature Conservancy, 4011 University Drive, Suite 201, Durham, N.C. 27707. You will receive further information about the trip before the date. The trips fill up quickly, so please sign up soon.

North Carolina State Parks

Public access is encouraged at several state parks where Carolina bays are prominently featured. For an informational brochure and map of each of these parks, contact the Division of Parks and Recreation, Department of Environment and Natural Resources, P.O. Box 27687, Raleigh, N.C. 27611, (919) 733-PARK.

Jones Lake State Park. Located in Bladen County, 4 miles north of Elizabethtown on N.C. Highway 242. Over a mile long, Jones Lake is one of the few water-filled bays in the state. A 3-mile trail circuits the lake. Boating, hiking, camping and picnicking are allowed. Jones Lake State Park, 113 Jones Lake Drive, Elizabethtown, N.C. 28337, (910) 588-4322.

Lake Waccamaw State Park. Located in Columbus County, 38 miles west of Wilmington and 12 miles east of Whiteville, on State Road 1947 (Bella Coola Road). Of all the bay lakes, Lake Waccamaw is the largest, with nearly 9,000 acres of water and 14 miles of shoreline. Several unique species found in the lake make it a mecca for biologists. Lake Waccamaw State Park, 1866 State Park Drive, Lake Waccamaw, N.C. 28450, (910) 646-4748.

Pettigrew State Park (Lake Phelps). Located in Washington and Tyrrell counties, 7 miles south of Creswell off U.S. Highway 64. This is the second largest of North Carolina's natural lakes. Boating, camping, picnicking and hiking are allowed. Pettigrew State Park, Route 1, Box 336, Creswell, N.C. 27928, (919) 797-4475.

Singletary Lake State Park. Located in Bladen County on N.C. Highway 53, 10 miles southeast of Elizabethtown and 6 miles east of White Lake. The perfect oval shape of this lake identifies it as an ancient Carolina bay. It is the deepest of all the bay lakes, with a maximum depth of almost 12 feet. Hiking and group camping are encouraged. Singletary Lake State Park, Route 1, Box 63, Kelly, N.C. 28448, (910) 669-2928.

Further Reading

- "The Riddle of the Carolina Bays," by Kevin Krajick in *Smithsonian* Magazine, September 1997.
- *North Carolina WILD Places: A Closer Look*, edited by Lawrence S. Earley (N.C. Wildlife Resources Commission, 1993).

than I could ever hope to understand. I am aware that others experience this same phenomenon, though we rarely speak of it. Occasionally someone will venture to say something like, "This is a really neat place," and though the words fall short of the intended praise, I know what they mean.

If I have a favorite bay, it is probably Goose Pond Bay in Robeson County. That site, about 113 acres in total area and partially owned by The Nature Conservancy, is one of the more species-rich bays and has provided me with countless fond memories. Among its many interesting features is one of the largest stands of the rare sarvis holly (*Ilex amelanchier*) known to exist on earth. It is also located perilously close to the site of one of my all-time favorite restaurants—Chason's of Lumber Bridge, which surely had one of the largest and tastiest country buffets in the world, until it burned down on a terrible day in January 1997.

For many years, the Museum of Natural Sciences has assisted The Nature Conservancy in documenting and monitoring the flora and fauna—particularly the reptiles and amphibians—of its Carolina bay properties, and this has given me an excuse (as if any were needed) to visit them frequently. After years of visits, new species still turn up. Some of my favorite times to visit are from December to March. Winter is commonly thought of as "down time" for herpetologists like me, and it can be, if reptiles are your only interest. But many amphibians breed in the dead of winter, and some of the rarer and more exciting ones breed in the bays. I stopped loathing the colder months after I discovered that I could see all three color phases of the ornate chorus frog on a January night, or turn frozen cypress logs to uncover Mabee's salamanders, or find tiger salamander egg masses under the ice. Now my cold-weather visits, and the associated observations of winter-breeding amphibians, have become almost vital to my survival during those long months when spring seems too far away to ever actually arrive.

I have had experiences in bays that I would not trade for any others that nature has graced me with. Some are permanently etched into my memory as cherished images: The tip of a tiger salamander's tail protruding from the mud beneath a log. A barking tree frog perfectly camouflaged on a cypress branch above a paper wasp nest. A raccoon asleep in a cypress stump. A rare glossy crayfish snake—representing both a new county record and a range extension for the species—under a log in a dry bay in December. A family of young screech owls leaving their nest. A corn snake under tin at the edge of a bay in February. A brown-headed nuthatch excavating a nest cavity in a cypress. A

writhing swarm of 10 tiger salamanders in courtship under one log. Nesting anhingas. Night herons, woodcocks, waterfowl, rusty blackbirds. Long-necked chicken turtles. Strange isopods, amphipods, copepods, clam shrimp. Bladderworts and sundews.

And always frogs. Deafening spring peepers. Muffled growls of shy gopher frogs on March nights. The challenge of sneaking up on a Southern chorus frog. An amorous male leopard frog mistakenly clasping a pair of ornate chorus frogs as they mated. To stand in one spot and see a half dozen different species inflating their vocal sacs within the range of my flashlight beam.

Other memories are difficult to visualize, but equally treasured. Some involve having taken other people to bays for the first time, and having shown them things they had never seen before and possibly never knew existed—having shared with others an appreciation for places that are beyond special and beyond wonderful.

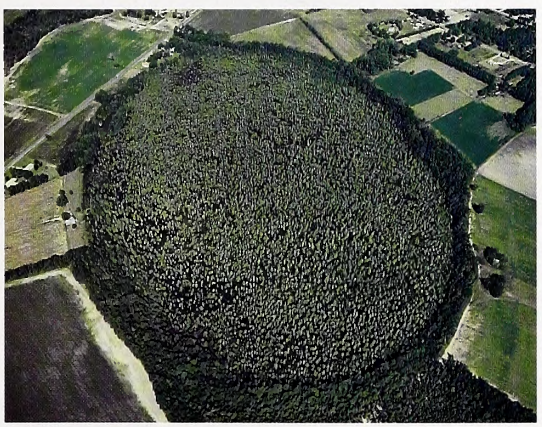
But like virtually all other truly special and wonderful things in the world, bays have been, and continue to be, destroyed. Untold numbers of the smaller ones have long since vanished under tractor and backhoe. Driving through or flying over some areas of the Carolina Coastal Plain, one can see huge agricultural fields with dark, oval areas in them that were once small bays. Some of these still hold water during wet periods and may still ring with frog calls after a hard rain, even though they are now plowed fields. Others have been spoiled by development, like Lake Waccamaw and White Lake, now both resort communities. For some idea of how White Lake once looked, visit Singletary Lake or Jones Lake, two of the larger bay lakes that have been afforded some protection as state parks. The majority of the remaining smaller bays are still in private ownership, and efforts are under way by various conservation groups to purchase or otherwise protect as many of those as are still relatively intact.

Bays also face more subtle pressures. The digging of wells for human use may be lowering the water table of some bays. Fire suppression may also be harming them; historically, they probably burned during hot, dry periods. The lowering of the water table and elimination of fire may allow the encroachment of woody vegetation such as small pines. Once established, these plants continue to suck water and may result in eventual drying of the sites. The Nature Conservancy has experimented with controlled burns and selective cutting of encroaching pines and hardwoods on some of its bay properties. The ecology and hydrology of these areas are so complex and baffling, however, that management activities of any sort are a delicate and questionable business.

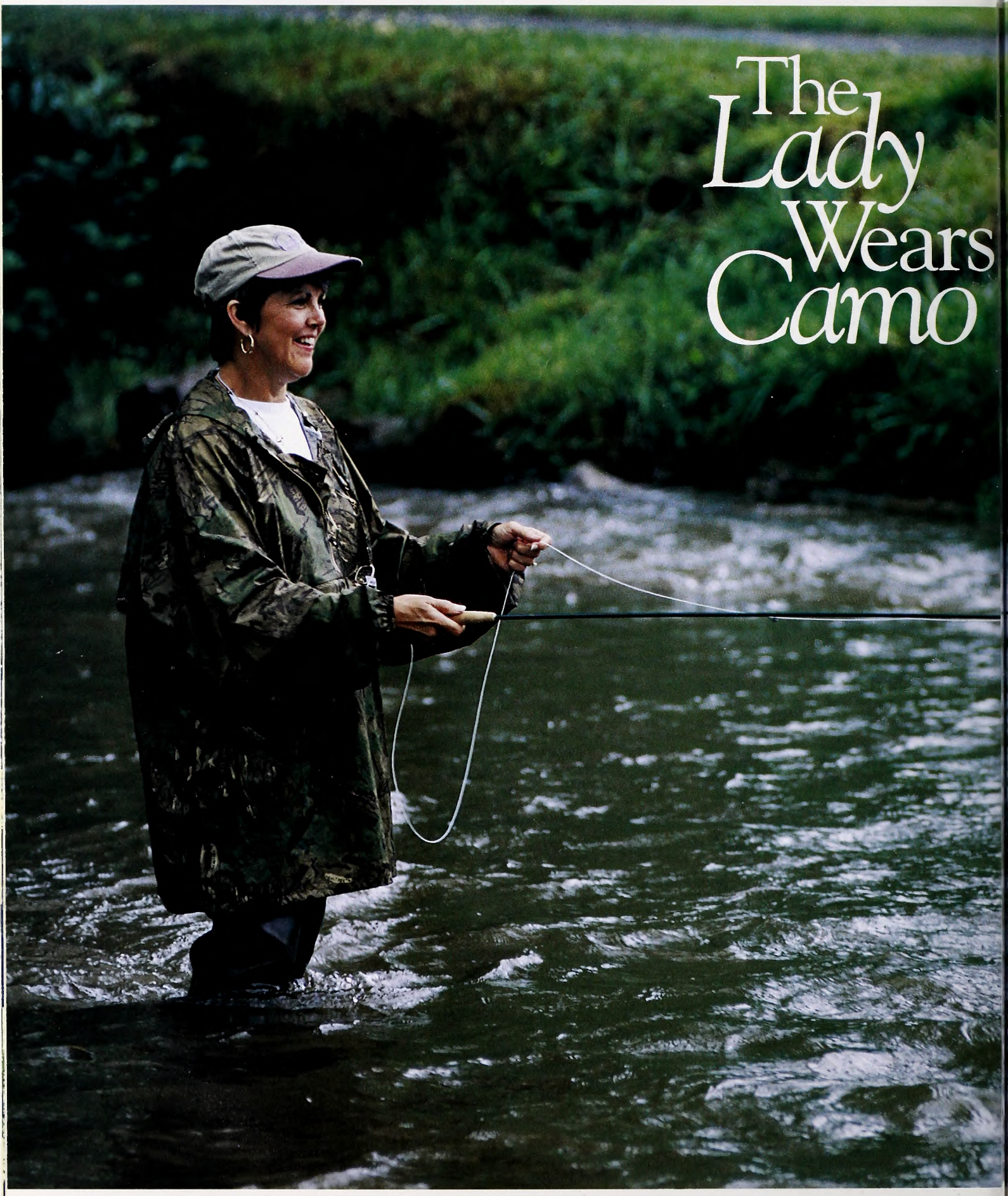
Whatever their origin, Carolina bays make up an absolutely irreplaceable part of our natural heritage. Perhaps we may yet find it within our wisdom to protect enough examples of those that remain to provide a future for species that depend on them for survival, and to provide future generations of our own species with some idea of what the Coastal Plain of the Carolinas was once like. With all my heart, I hope so. Perhaps someday we may also be able to determine, beyond all doubt, how Carolina bays were formed. With at least part of my heart, I hope not. ⊠

Jeff Beane is a curator of herpetology at the N.C. Museum of Natural Sciences.

JACK DERMID



***Among the many** amphibian species found in Carolina bays is the narrow-mouth toad (top) which breeds from May to July. A characteristic plant of the wet bays is the carnivorous sundew (bottom) which secretes sticky globes of liquid that trap and digest insects. Pretty Pond (left) is surrounded by agricultural fields, illustrating the fragile nature of today's Carolina bays. Without a generous natural buffer around a bay, wells dug for developments can lower the bay's water table and threaten its continued existence.*



The Lady Wears Camo

MELISSA McGAW

The fairer sex? Of course, but that doesn't mean women also can't be competent with shotguns, flyrods or motorboats. That's the message women of all ages are learning in Becoming an Outdoors Woman workshops.

written by Darcia Bondurant ©1998
photographed by Ken Taylor

Like a child eagerly awaiting summer camp, I couldn't wait for North Carolina's first Becoming an Outdoors Woman weekend. Getting together with 100 other women to learn wilderness skills sounded intriguing. Preferably they would be women who weren't afraid of putting a worm on a hook, getting cobwebs in their hair or—*yikes!*—being seen in public without lipstick.

I could pick only four of the classes, although there were many good choices—archery, canoeing, Dutch-oven cooking, shooting, fishing, fish identification, photography, survival skills, boating and even turkey calling. My husband suggested Dutch-oven cooking, fish identification and canoeing. (At least he didn't suggest I learn how to gobble like a turkey.) He wanted a wild-woman Julia Child. I wanted shooting, fishing, and bows and arrows. Skip the cooking lesson. I was eager to learn how to catch dinner, not cook it!

I decided to try fly fishing because, being a flatlander, I didn't know a thing about it. As I watching the practiced grace of the fly fishermen in the movie *A River Runs Through It,* I didn't understand why the anglers cast their line back and forth without dropping it in the water.

I didn't even know why it was called fly fishing. Most people I know use shrimp or worms for bait. When I had the revelation that the lure, or fly, was meant to imitate a live fly—the fish's dinner—a male friend gave me a look that said, "How can you not know that?"

The answer is that unlike men, women haven't been pointed in the direction of outdoor activities such as hunting, fishing, boating or camping. Having grown up without a father (he died when I was 8), I had experienced wilderness activities that added up to only a few fishing trips to a lake with my grandfather. That's why the BOW weekend is so attractive to women. It creates a nonthreatening environment for us to learn what we may have missed in our childhoods and what we may still be missing for whatever reason.

Gaining confidence to spend more time outdoors was the goal of the weekend, said Capt. Randy Thomas, who

Whether they are *mending a flyline (left) or drawing a bow (above), women excel at many outdoor activities if they are given a chance to develop their skills. The N.C. Wildlife Resources Commission's new BOW program is part of a national effort to break down the barriers that have historically prevented women from enjoying outdoor activities including hunting and fishing.*

Participants in *North Carolina's first Becoming an Outdoors Woman workshop learned plenty of outdoor skills over the course of a weekend while developing lasting friendships with women from across the state.*

Among the varied *outdoor courses offered at the inaugural BOW event held at Western Carolina University, (clockwise from left) participants were taught basic paddling skills, how to erect a tent, rifle marksmanship and how to trailer a boat. Wildlife Enforcement Officer Linda Guedalia (above) and Lt. Mike Stephens (right) served as willing instructors at the three-day event.*

MELISSA McGAW

The BOW program *develops in women the outdoors skills that many men take for granted. Wildlife education specialist Katrina McDougald (above) teaches participants stream ecology at last spring's workshop while another group practices fire-building (right). Meanwhile, a budding female angler (far right) proudly displays a "trophy" taken with a flyrod during the fishing course.*

coordinated the workshop for the N.C. Wildlife Resources Commission. "We found that women weren't exposed to outdoor activities as children," he said. "Usually fathers took their sons fishing or hunting."

The North Carolina BOW workshop is part of a national program to break down the psychological and social barriers that have historically prevented women from enjoying outdoor activities such as hunting and fishing. BOW is the outcome of a 1990 workshop at the University of Wisconsin to examine the reasons why so few women participate in these activities. Give women a chance to learn the skills, the participants believed, and they would respond. Indeed they have. The first program was held in 1991, and its popularity has grown each year since. Last year, 10,000 women in 44 states learned outdoor skills in BOW workshops.

My first class was basic fishing. It didn't sound as rugged as the survival skills class ("women who run with the wolves"), but anything that would make it easier to catch dinner sounded pretty good. The instructor, Lisa Hughes, exuded confidence and was knowledgeable about fishing and equipment. She put us budding anglers at ease.

"Women are naturally better student anglers," she said. "Men are born thinking they know everything about fishing and sex." Lots of knowing laughs erupted from the class.

She said she wanted to teach us as much as she could in three hours to give us the confidence to fish more often. Class members' experience ranged from that of Hughes, who had fished most of her life, to that of a Southern belle, who didn't even like putting rubber worms on a hook with her manicured hands.

"I fish a lot mostly because I married into fishing," the belle said in a sweet drawl.

Many women discovered that they liked whatever they tried—canoeing, photography, even target shooting. Many also found out that they weren't half bad out on the firing range. Some were naturals. One woman hit seven out of 10 skeet the first time she ever fired a shotgun. Another woman gushed about feeling relaxed after target shooting with the rifle. In the middle of a scenic mountain shooting range could be heard the clamor of women cheering each other.

Another exciting class was boating, which included learning how to back up a boat trailer—something many women did for the first time in their lives. Susan Pollard of Clayton said that she had always wanted to drive a motorboat, pull the boat up to a dock and back up the trailer, but that she had never learned how. "Women have been shut out of the loop. My brother did it, but it was totally out of my experience," said 46-year-old Pollard.

During the BOW weekend, Pollard learned—well, everything but backing up the boat trailer. "It's not my strong suit," she had to admit, adding that she attended the workshop with her 28-year-old daughter so they could learn outdoor skills together. Another woman said that she would now be able to instruct her husband and correct his backing habits.

Outdoor survival skills was another popular class. Among other things, Diana Belknap, of Outward Bound in Asheville, taught the women how to light a wet campfire by dripping candle wax on the kindling before striking the match. The women also shared stories about the Dutch-oven cooking class, where they learned how to cook biscuits in a foil-covered box and an entire chicken in a can.

I took a class in archery, something I had tried more than 15 years ago in college. While I enjoyed feeling like Ms. Robin Hood, I had a 4-inch bruise on my inner left elbow that lasted longer than the fleeting pleasure I took from the activity. It quickly became apparent why I had shelved archery. It's a quirk of nature that a fair number of women have an elbow that protrudes into the path of the bowstring as it slings an arrow toward the target. Although I left archery class with a black-and-blue badge, one 28-year-old woman so loved her introduction into archery that she planned to buy the latest aluminum-carbon composite compound bow.

What really made an impression on me at the BOW workshop was the diversity of the women who attended. Women of all ages were present, all touting different beliefs, yet all with a love and respect for the outdoors. Some women enjoyed hunting deer and turkey, while others were drawn to pond and stream ecology. Three days of sharing meals gave us a chance to mingle with a variety of women, from swan hunters to vegetarians.

The women, many of whom tried something they had always wanted to do, wanted the weekend to last a week so they could learn even more outdoor skills. They clapped and cheered at any mention of making history as the first 100 women to attend a BOW workshop in North Carolina. The majority clamored to get on board for the next workshop.

Overall, it was the camaraderie that the women loved.

"I was on the range in the basic shotgun class, and we were all watching the women shoot," said Marguerite Moore of Chapel Hill. "When someone hit a clay, we all cheered. We were all in it together."

Just about all the classes were about gaining confidence. The instructors, mostly volunteers who wanted to teach women, taught the group members the basics so they could later pursue the sport if it interested them.

I personally discovered that it was OK if I hooked my shoe instead of a trout while fly casting, that some women still don't like to bait a hook, and that the only thing better than summer camp as a girl was summer camp as a woman.

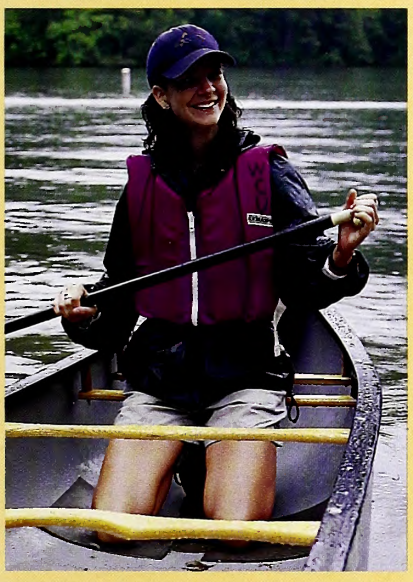
Later, on my wedding anniversary, I was surprised when my husband gave me a fly rod and reel, wading shoes, and line.

"What made you decide to get me a fly rod?" I asked.

"Because you were so excited about the Becoming an Outdoors Woman weekend," he said, with a knowing look.

I have since bought a camouflage shirt, pants and a fly fishing vest. I've been out once, and I can tell it's going to take some practice. I may not yet know how to prepare the best fish dinner, but one of these days, I'm going to catch it. ☒

Second BOW Workshop Set for Piedmont



North Carolina's second annual Becoming an Outdoors Woman workshop will be held at Camp Caraway near Asheboro on June 5, 6 and 7. The workshop will be limited to 100 women ages 18 and up. It costs $160 including all meals and lodging. For more information and registration forms write: Becoming an Outdoors Woman, N.C. Wildlife Resources Commission, 512 North Salisbury St., Raleigh, N.C. 27604-1188, or call (919) 733-7191.

Those with Internet access can visit the Becoming an Outdoors Woman home page for general background, newsletters and other information. Address: http://www. uwsp.edu/general/commun/BOW/BOWPAGE.HTM

Farming's Quiet Revolution

WILLIAM S. LEA

With no-till cultivation, Halifax County farmers produce healthy crops while protecting their soil against erosion. Best of all, these "ugly" fields offer plenty of food and cover to small game.

written by Carl Betsill
photographed by Ken Taylor

On April 12, 1776, a group of farmers in Halifax County signed what was to become known as the Halifax Resolves and began a revolution. There must be something special about Halifax farmers. They may just be a breed of advanced thinkers, or perhaps it is something in Nagazine Springs water. Who knows?

One thing is for sure: They are at it again. They're starting another revolution, but this time, instead of a political revolution, it is a conservation revolution. Halifax County farmers are developing a land ethic unequaled in any other part of the state, one that has great potential to improve farm profits, aid soil conservation, save time and labor, reduce dependency on expensive machinery, and, equally important, help restore habitat for early-successional wildlife species, including rabbits and quail.

Perhaps this revolution may not seem as important as the American Revolution, but to a world of expanding populations fighting to feed itself, it might well turn out to be. What the farmers of Halifax have done is quit plowing. Not since John Deere invented the moldboard plow in 1835 has metal not turned some of their soils in this northeastern North Carolina county. Now it seems that over half the farms you pass are untilled, and the number of untilled farms is growing annually.

These changes have not come easy. Just pretend for a minute that you are a farmer and your family has been tilling the land since 1835. Perhaps you graduated with a bachelor's degree in agriculture from N.C. State University, where everything you were taught was based on farming practices that involved tilling the soil. Fertilizer rates, pesticide amounts, crop yields were all based on a system of conventional tillage using a plow. You are probably in debt up to your ears for that new $120,000 tractor and can't afford to experiment with new ideas. The safe thing is to stick to what has worked for the last 150 years. Even the old professors at your alma mater may think you are crazy to consider quitting the conventional way.

***Though their fields** may appear a bit unkempt, Halifax County farmers are sparing the plow to improve soil conditions and leave cover and food for rabbits and other wildlife. A no-till farmer (above) applies a herbicide to a soybean field with a hooded sprayer to protect the crop.*

Well, Halifax farmers didn't stick to the safe way in 1776, and their courage is still alive today. These farmers are practicing a new form of agriculture, and just as they were rewarded for their courage in the American Revolution, they are being rewarded today.

While bottom plows and high-dollar eight-wheel tractors with 24-row gang discs sit idle, slowly being overtaken by vines, crop yields in Halifax County are increasing. Fields that once produced 2,000 pounds of peanuts per acre are now producing 4,000. Fields that once produced 300 to 400 pounds of cotton per acre are now yielding 600 to 700 pounds per acre.

Farmers who might well have gone broke trying to farm hillsides of clay and rock are still in business. Fields that once showed the "red scald" characteristic of topsoil erosion are now turning brown and showing an increase in organic matter. Hilltops that once failed to produce or turned out poor, stunted crops are now as green as the rest of the fields. Hills with 10- to 12-percent slope no longer have to be taken out of production to prevent gully erosion. Instead of watching their fields decline in productivity each year, Halifax farmers are looking at fields that are increasing their productivity.

Wayne Short, with the Natural Resources Conservation Service, describes what has happened in the county by explaining that agricultural producers have quit being "miners" and are now being farmers. In the past, every time a crop was produced, a little something was taken away from the soil. Every season, a little more topsoil was lost.

Despite its neat, *clean appearance, a typical plowed field (above) has been depleted of most of its nutrients and beneficial microorganisms. After generations of being turned over with a plow, much of the fertile topsoil has been lost to erosion and must be replaced with chemical fertilizers.*

As a result, more fertilizer was needed the next year. The soil, once a living, breathing, complex ecosystem, was dying. Agricultural producers could "mine" the land only so long before it gave out.

With the revolution in not tilling the land, agricultural producers are now true farmers and builders of the land. Their practices are building the soil, keeping it in place. As a result, beneficial microorganisms, insects and earthworms are returning. This not only helps the soil and the crops but also benefits wildlife by encouraging the basic food chain that quail, rabbits and many songbirds depend on. With no-till farming, the remaining crop residues and field edges provide nesting habitat for a variety of birds, including quail, and serve as cover for many small species. Conventional stripped-down fields, on the other hand, provide little if any habitat for wildlife.

Studies across the country are proving that no-till systems designed to conserve soil also benefit wildlife. In one study in western Tennessee, researchers found more bobwhite quail nests in no-till fields than in similar ones under conventional tillage. Another study showed that invertebrate, bird and small-mammal populations were all much higher and more diverse in cornfields using no-till rather than conventional methods. And a recent North Carolina study found that bobwhite quail chicks were able to meet their daily food requirements in no-till soybean fields in less than five hours per day.

Besides creating food and cover for birds and small mammals, no-till practices produce buffers that prevent sedimentation and other pollutants from reaching our streams and rivers. With soil erosion accounting for more than 40 percent of water pollution in our waterways, the benefit of cleaner lakes and streams that no-till farming offers for fish and other aquatic species is immense. And the potential of no-till for increasing small-game populations shouldn't be underestimated. Not since the small-farm era of the 1920s has there been an opportunity to create wildlife habitat on farms on such a vast scale. And it will likely take such a large effort to help some of our small-game species rebound.

Earlier I mentioned a land ethic. When you talk to Halifax County farmers, you realize that they have developed a strong sense of pride in what they are doing. These days, you are not considered a good farmer in Halifax County if you let your farm erode, if your hilltops are scalded or if your soil doesn't have earthworms.

One of these ethical farmers is Hubert Morris. Last summer, Wayne Short, *Wildlife in North Carolina* photographer Ken Taylor and I took a trip around Halifax County. As we pulled up to Hubert's farm, we saw him in the field chopping cotton with a hoe. Wayne shouted, "What's wrong, Hubert, couldn't resist a little tilling?" Morris explained that he had tried a new herbicide on the first four rows and it hadn't worked very well. The cheaper alternative hadn't worked out. Morris expounded on the merits of no-till. He even bragged about the number of earthworms in the field! He is so fond of earthworms that anytime he digs one up in his yard, he runs down and puts it in his cotton field.

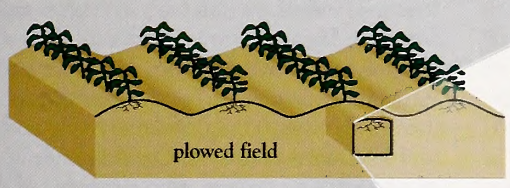
As we left, Wayne explained that if you had told him five years ago that farmers would be discussing the merits of earthworms, he would have laughed you out of his office.

No-till farming doesn't mean that you don't till the soil at all. You must cut a small slot in the soil to plant your crop, but you leave most of the soil undisturbed. The secret to no-till is that earthworms are naturally "turning the soil over," instead of your 200-horsepower tractor. They leave castings to serve as fertilizer and holes for aeration and water absorption. And the crop's residues serve as a natural mulch, keeping the soil moist and providing organic matter for the earthworms to work into the soil.

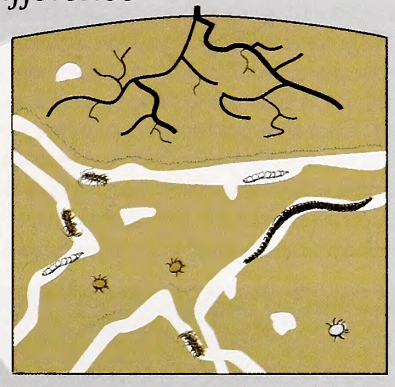
It is absolutely amazing to see them work, Wayne explained. "At the first of the season, the ground is completely covered with litter

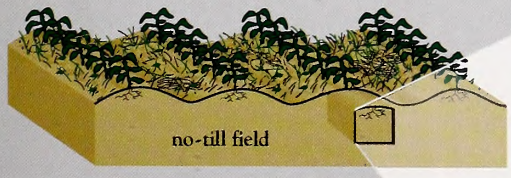
A *no-till field* *(above), by contrast, uses last season's stubble to hold the soil in place and relies on earthworms and other soil invertebrates to turn over the soil naturally. The result is a rich, organic soil (inset) that is ideal for growing crops and that encourages the basic food chain that many wildlife species depend on.*

The No-Till Difference

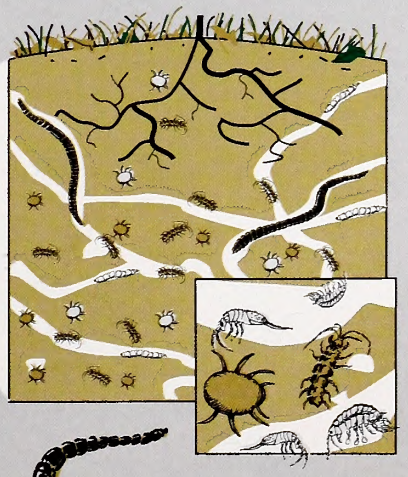


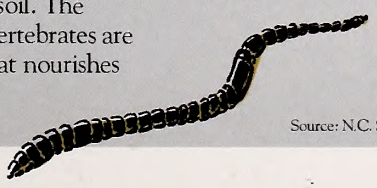
In a conventionally plowed field in North Carolina, the soil is mixed thoroughly and the bare surface is easily eroded by wind and precipitation. As a result, topsoil loss is increased and the soil itself has less earthworms and other invertebrates that do the work of decomposition.





Under a no-till system, a layer of plant debris keeps the soil in place and swarms with invertebrates. In the litter layer at the surface, microscopic mites, springtails and other decomposers break down dead plants into smaller pieces. Earthworms work this rich organic debris deeper into the soil. The teeming populations of soil invertebrates are part of the basic food chain that nourishes songbirds and small game.





GRAPHIC BY LEE RATCLIFFE

Source: N.C. State University Dept. of Entomology

from the last crop. By the end of the growing season, almost all of the litter has been consumed by soil invertebrates."

Wayne went on to explain that no-till started in Halifax County as a legal way, under new federal legislation, to farm highly erodible land. On steep slopes and certain soil types, conventional tillage systems simply would not hold the soil in place. No-till systems were used as a last resort, instead of putting in expensive terracing and taking parts of the field completely out of production with grassed waterways. A few observant farmers began to notice their yields increasing and their soils changing in these highly erodible fields. It didn't happen the first year, but each year that they spared the plow, their yields improved.

A few of these farmers began to feel that revolutionary spirit. What if they used this method on their better soils? This is where it takes courage. Some were courageous enough to make the step all in one year. Others tried one crop at a time. Wayne explains it this

What Farmers Are Saying

"I have found no-till to be as good or better than any conventional tillage method. My highest-yielding field last season was grown in no-till. It helps us to establish field borders for quail and rabbits without tearing them up each spring with a plow. No-till gives wildlife more food and cover year-round instead of leaving the ground bare."

– John Branham, Halifax

"There is no comparison between no-till and conventional tillage. Besides making the soil more productive, we are creating the food chain and habitat on the ground that both plants and wildlife need. Everything starts at the small level."

– David Iles, Littleton

"It's your choice, whether you take it all or leave some of the soil. The same goes for wildlife. I, myself, would rather leave the land in a better shape than it was when I started farming."

– Tom Harris, Littleton

way: "Ten years ago, 85 percent of the agricultural producers in this county were miners; today, 85 percent are farmers."

Soybeans were the first crop to go the way of no-till. Beans are usually planted in standing wheat or rye. The fields are not pretty at first—just a faint line of green plants coming up under the golden brown wheat stalks. Farmers in the area quickly termed the technique "farming ugly." Weeds usually invade between the rows before the first herbicide treatment. The mere appearance of these "ugly" fields was more than some farmers could handle. The farm ethic they were brought up with meant that a field like this was managed by a lazy farmer. The yields on these no-till fields were the only thing that overcame this old ethic and replaced it with a new one—in which "farming ugly" is a good thing.

At first, farmers hid their no-till beans in the back fields so their neighbors wouldn't laugh at them when they failed. As the no-till

Instead of "mining" *the soil with traditional farming methods, many Halifax County farmers are now building the soil by using "no-till" methods. Wayne Short (left), with the Natural Resources Conservation Service, shows some of the rich soil created by sparing the plow.*

pioneers gained confidence, that quickly changed. Experiments then proved no-till would work with other crops, including corn, cotton, sorghum and peanuts. It is now common to see any of these crops being no-tilled in Halifax County. In fact, in my drive around the county, I think it was actually more common to see these crops in no-till than not.

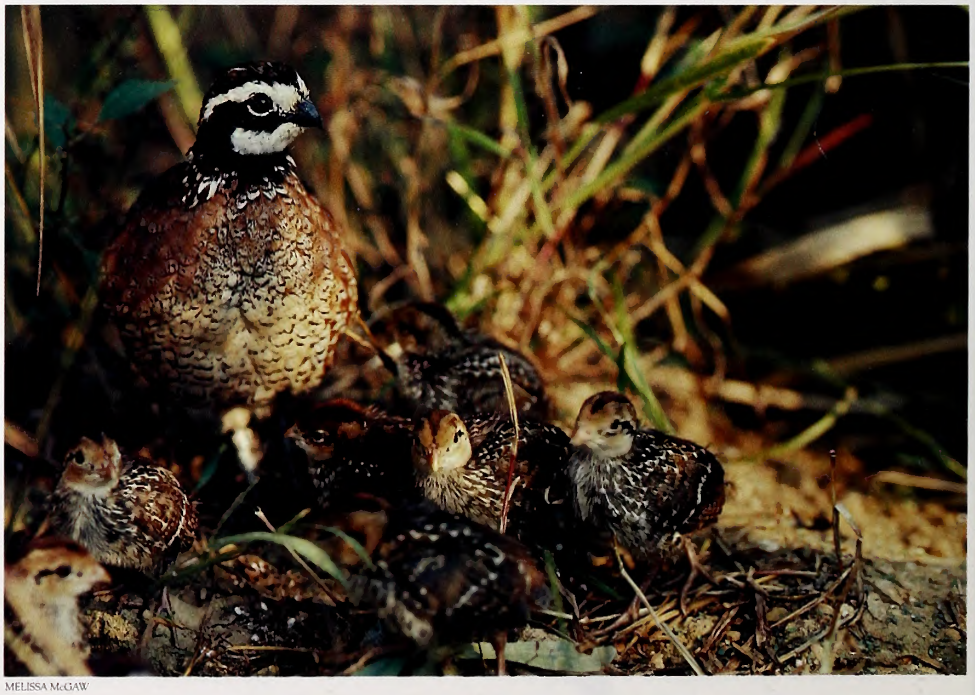
"The last crop to go to no-till is tobacco," Wayne explained. "It really takes courage to risk a $3,000- to $4,000-per-acre investment." But that is what we saw when we pulled into a field path: conventional-till tobacco on one side of the road and no-till tobacco on the other. "It really takes a lot of self-confidence to do this," Wayne said.

As farmers in Halifax gain more confidence, there is no doubt tobacco in a no-till system will soon become as common as soybeans grown that way.

On our ride back to the NRCS office, I asked Wayne about the trade-offs. This sounds too good to be true. "What about the increased use of chemicals needed to grow crops without tillage?" I asked.

"A myth," replied Wayne. He explained that the same herbicides and pesticides are used in both systems. One additional "kill-down" spraying is done prior to the initial planting. After that, everything is the same. In some cases, as beneficial insect populations build up in no-till fields, the application of pesticides decreases. Also, there is less leaching of nitrogen from the soil. Excess nitrogen actually binds to the increased organic matter instead of leaching into the groundwater.

The only down side honestly seems to be the learning curve. No-till farming is different. The risks are different. The pests are different. The equipment is different. The training is by word of mouth. There are few Agricultural Extension Service agents out there with enough confidence to really push no-till in many situations. Equipment dealers and fertilizer dealers are not overly fond of no-till. The system requires smaller tractors, less fertilizer and less equipment. This



MELISSA McGAW

Besides saving *farmers money and preventing soil erosion, no-till practices benefit wildlife by providing cover and food for many species including bobwhite quail, rabbits and songbirds.*

***Rusting, unused** gang disks and plows (above) are common sights on no-till farms. No-till methods have made many pieces of expensive farm equipment obsolete, to the delight of small farmers. Wildlife biologists, meanwhile, are excited about the prospects of a landscape-wide change in farming that could help small-game populations rebound.*

has a big impact on agribusiness in general. More money in the farmer's pocket means less money to many of these middlemen. A shake-up of an economic system always means a difficult row to hoe (no pun intended).

What does all this mean for wildlife? If you have been reading anything about small game over the past year, you probably understand. We have been saying that our approach to small-game management has to involve change on a large, landscape scale. That is exactly what we are talking about with no-till farming. It is a landscape-scale change being promoted not by a wildlife conservation agency but by economics. Just as wildlife benefited as a by-product of the small-farm era of the 1920s, wildlife will benefit from no-till in the future.

All upland wildlife studies to date have shown nothing but beneficial results when no-till crop production systems were compared with conventional tillage. Fish populations and wetland species benefit from cleaner waterways and streams. And humans also benefit directly from cleaner streams and cleaner ground water.

As a conservationist and a realist, I do not often get to talk about environmental good news. This is the exception. We are seeing a revolution in agriculture that can't be stopped. It is driven by economics that for once is on our side. It's the classic win-win situation. The farmer wins, the wildlife wins, the environment wins and the citizens of North Carolina win.

Am I too optimistic? Give me a break. It is the first time in my 20-year career that I haven't been preaching doom and gloom. Long live "Farming Ugly"! ⊠

Carl Betsill is a wildlife biologist with the N.C. Wildlife Resources Commission.

Give Ugly Farming a Try

What started as a method to farm marginal, steep land, is proving to be an excellent way to conserve rich topsoil, prevent erosion, reduce farm costs, protect streams and, best of all, help wildlife on all farms.

In North Carolina, no-till farming is most widely used with soybeans, but other crops, including peanuts, corn, cotton and even tobacco, are being grown with no-till techniques. Overall, more than 18 percent of all crops produced in the state are grown using no-till, and that number is expected to continue to rise as more farms convert to the practice.

As a bonus to farmers, there are two cost-share programs available to assist them in setting up and maintaining no-till fields:

- The North Carolina Agricultural Cost-Share Program provides funds to farmers who improve water quality by implementing the best-management practices. These practices, including no-till farming, reduce the amounts of sedimentation, fertilizers, pesticides and animal waste that enter streams and rivers.
- The Environmental Quality Incentive Program, administered by the U.S. Department of Agriculture's Natural Resources Conservation Service, is a cost-share program to help farmers implement the best-management practices to protect water quality.

Both programs require the establishment of long-term conservation plans on prospective farms. For more information about no-till farming and the related cost-share programs, contact your local soil and water conservation district office.

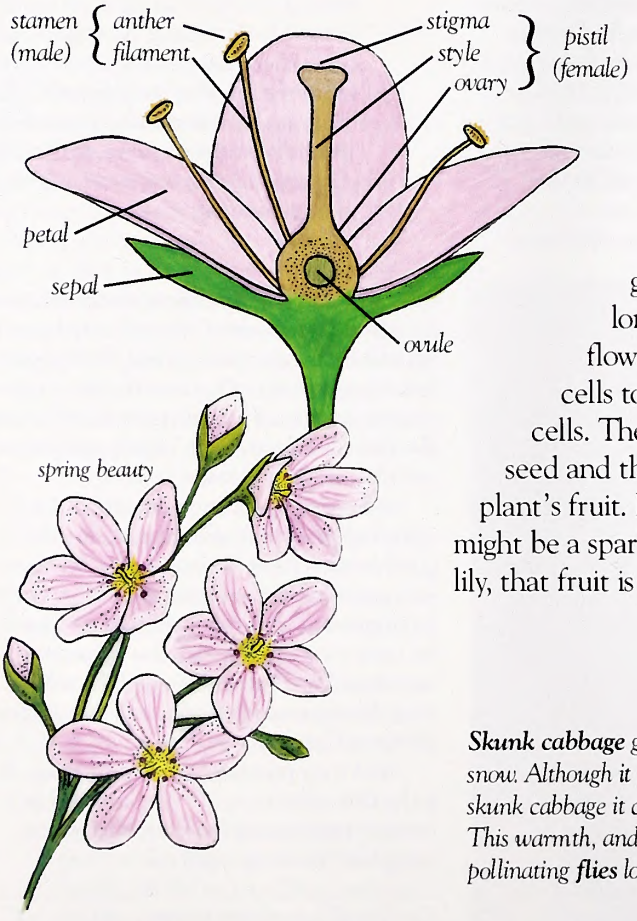
bumblebee on toadflax

Birds, Bees & Pollen!

There is an intricate relationship between flowers and the bees, bugs, butterflies and birds that pollinate them.

written by Carol Baldwin / illustrated by Consie Powell

blue-eyed grass



How Does Pollination Work?

Flowering plants have male parts, which produce **pollen**, and female parts, which ultimately produce seeds. **Pollination**, necessary for flowering plants to reproduce, occurs when pollen grains from an **anther** are transferred to a **stigma**. A pollen grain then **germinates**, grows a long tube down to the **ovule** of a flower, and enables male reproductive cells to fuse with female reproductive cells. The fertilized ovule develops into a seed and the ripening seed is a part of the plant's fruit. For an apple tree, that fruit might be a sparkling winesap apple. In a day lily, that fruit is a dry pod.

Toxomerus hover fly

***Skunk cabbage** gives off enough heat to actually melt snow. Although it may be freezing outside, inside the skunk cabbage it can be a toasty 72 degrees Fahrenheit. This warmth, and a strong odor like decaying meat, attract pollinating **flies** looking for a place to lay their eggs.*

*When a **honeybee** visits this **narrowleaf coreopsis,** she gathers nectar with her long **proboscis** and collects pollen to feed baby bees. Using comb-like hairs on her front legs, the bee scrapes the pollen that sticks to her hairy body into baskets on her hind legs. As the bee flies from flower to flower, pollen from one flower rubs off and pollinates the next flower she visits.*

COME HERE, MY BUZZING FRIENDS

Some flowering plants depend on wind to scatter pollen. Other plants disperse pollen by water. But most plants are pollinated by animals, primarily insects. Bees are the world's champion pollinators, but flies, butterflies, moths and even hummingbirds do their parts, too.

Animals don't visit flowers intending to pollinate them; they visit to find food or perhaps find a mate or lay eggs. But plants need their pollinator guests, so they have developed a variety of clever methods to attract them. The colors, shapes, smells and **nectars** in flowers are all means by which plants ensure pollination and their own continuing survival as species.

Many plants have colorful markings on their flowers that act as signposts, leading bees into the flower where they find nectar and collect pollen. Certain flowers that look plain yellow or white have distinctive markings that reflect **ultraviolet** light. Though invisible to humans, these markings can be seen by bees and butterflies, and they help direct insects to the part of the flower where nectar and pollen are found.

Other plants produce blossoms whose petals form a landing platform and whose entry is tight. As a bee forces its way inside to get nectar, it inadvertently picks up pollen.

Some plants that flower very early in spring actually produce and offer warmth as an incentive for insects to visit.

Brightly colored or pale night-blooming flowers often also use a sweet fragrance to lure bees, butterflies or moths looking for a nectar meal. Plants with green flowers often use a musky or putrid odor to attract flies seeking a place to lay their eggs.

*To humans a **marsh marigold** looks yellow; to bees it appears a gaudy purple.*

*The only bird that pollinates flowers in North Carolina is little bigger than a large moth. The tiny **ruby-throated hummingbird** has keen vision and a poor sense of smell, and the flowers from which it feeds are often red and have little or no odor. This hummingbird's long, tube-shaped tongue probes the deep, narrow throats of the **cardinal flowers** to find the nectar. Because hummingbirds **hover** while feeding, the flowers they pollinate usually hang down instead of providing landing platforms.*

*A **mining bee** is strong enough to squeeze into the tight entry of **jewelweed** blossoms.*

North Carolina WILD Notebook

Pollen from the ***butterfly-weed*** *collects on the body of a* ***tiger swallowtail butterfly*** *as it rests on the floral cluster, moves its proboscis from flower to flower and sips nectar.*

buckeye on Joe-pye-weed

What Does It Mean?

pollen: grains produced in a plant's anther that develop male sex cells

pollination: the transfer of pollen from the anther of a flower to the stigma of the same or another flower

anther: a male part of the flower that contains pollen grains

stigma: a female part of the flower where pollen grains are deposited

germinate: to begin to grow

ovule: a structure that contains the female cells and develops into seeds when fertilized

nectar: a sugary solution secreted by some flowers; it is used as a food by some animals and attracts them to flowers ready for pollination

proboscis: a long tubular extention of the mouthparts

hover: to remain suspended in the air by very fast wing beats

ultraviolet: light of shorter wavelengths than the light visible to humans

It's WILD!

Project WILD activities for teachers and students that correlate to this topic include:

Animal Poetry: teaches students to recognize and experience the inspirational value of wildlife.

Good Buddies: teaches students to define symbiosis, commensalism, mutualism and parasitism, to identify animals living in these relationships, and to understand the intricate web of interdependence involved.

Shrinking Habitat: teaches students to evaluate the importance of suitable habitat for wildlife and to describe the effects of human development of land areas on plants and animals.

Editing and design by Consie Powell
Art puzzle by Anne Marshall Runyon

Read And Find Out

❀ *Animals That Eat Nectar and Honey* by Alice L. Hopf, Holiday House, 1979.

❀ *From Flower to Flower: Animals and Pollination* by Patricia Lauber, Crown Publishers, 1986.

❀ *How Plants Are Pollinated* by Joan Elma Rahn, Atheneum, 1975.

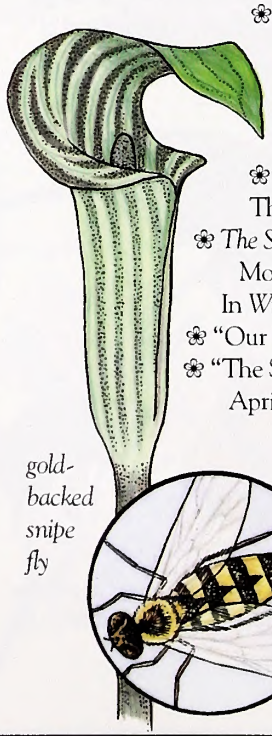
❀ *Look At A Flower* by Anne Ophelia Dowden, Thomas Y. Crowell Co., 1963.

❀ *The Sex Life of Flowers* by Bastiaan Meeuse and Sean Morris, Facts on File, 1984.

In *Wildlife in North Carolina:*

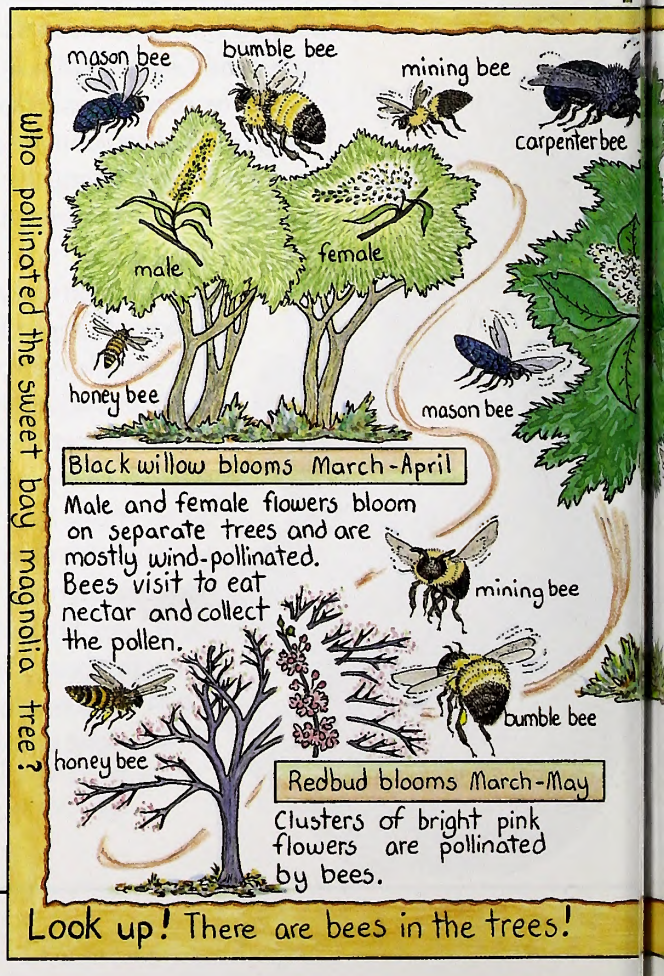
❀ "Our Wild Orchids" by Doug Elliott, June 1981.

❀ "The Sex Life of Plants" by Lawrence S. Earley, April, 1987.



gold-backed snipe fly

The not-so-sweet ***Jack-in-the-pulpit*** *attracts pollinators with an odor rather like an old ham sandwich.* ***Gnats*** *and* ***flies****, seeking a good place to lay their eggs, find their way inside the smelly green flower and leave with a load of pollen.*



North Carolina WILD Notes

Butterflies and moths are both attracted to sweet-smelling flowers. Butterflies feed during the day and visit bright-colored blooms, while moths, which feed at night, find white or light-colored blossoms that are easily seen in the dark.

Get WILD

Upcoming advanced N.C. WILD workshops for educators include:

April 18-19—*Migratory Songbirds*. Cool Springs Environmental Education Center, New Bern. Katrina McDougald. (919) 751-2040.

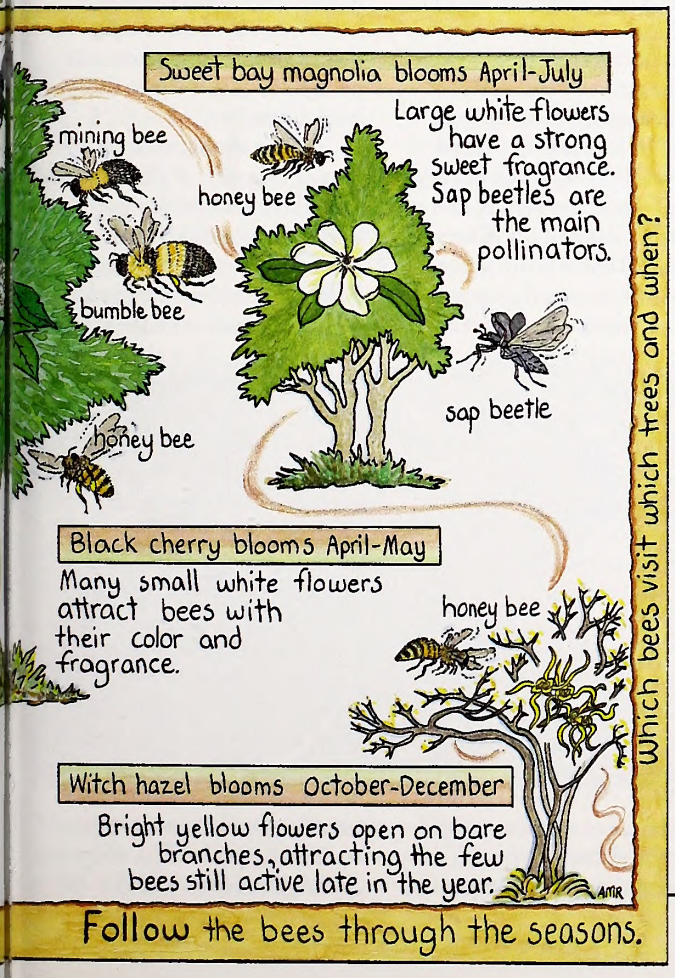
April 24-25—*Salamanders: To Know Them Is to Save Them*. New River State Park, Jefferson. Jan Cortelyou Lee. (919) 541-5393.

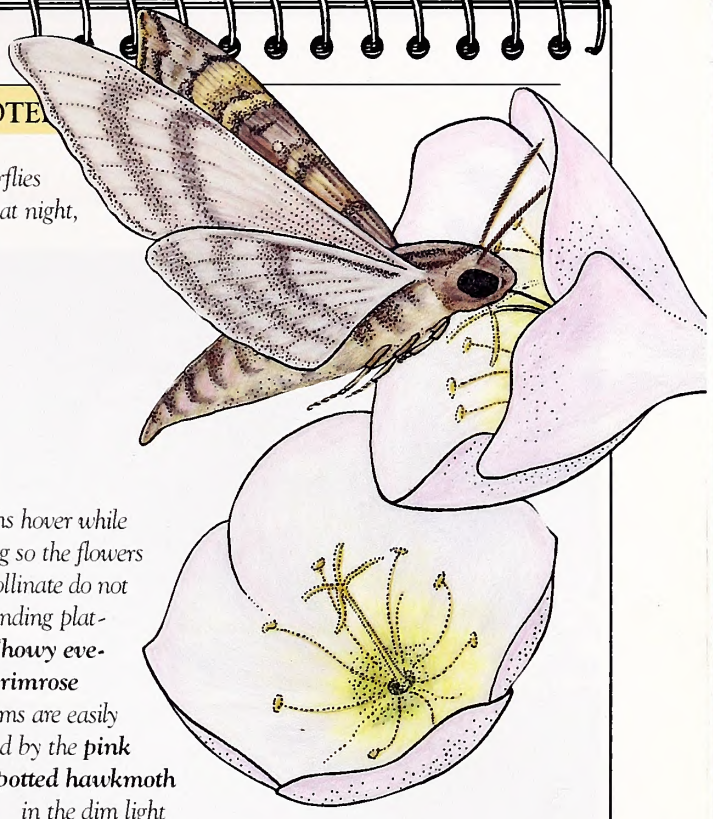
June 1-3—*Coastal Aquatic Ecosystems of the Lower Neuse River*. Camp Don Lee, Oriental. Laurieann Phalen. (919) 249-1106.

June 23-24—*Endangered Species*. Pisgah Center for Wildlife Education, Pisgah Forest. Laura Elliot. (704) 877-4423.

June 29-July 1—*Mountain Stream Ecology*. Pisgah Center for Wildlife Education, Pisgah Forest. Laura Elliott. (704) 877-4423.

To sign up or to learn more details, call the listed contact or check our web page at **http://www.sips.state.nc.us/ Wildlife/ ConservationEd/wild/calendar/**





Moths hover while feeding so the flowers they pollinate do not need landing platforms. ***Showy evening primrose*** *blossoms are easily found by the* ***pink spotted hawkmoth*** *in the dim light of night.*

Get Outside

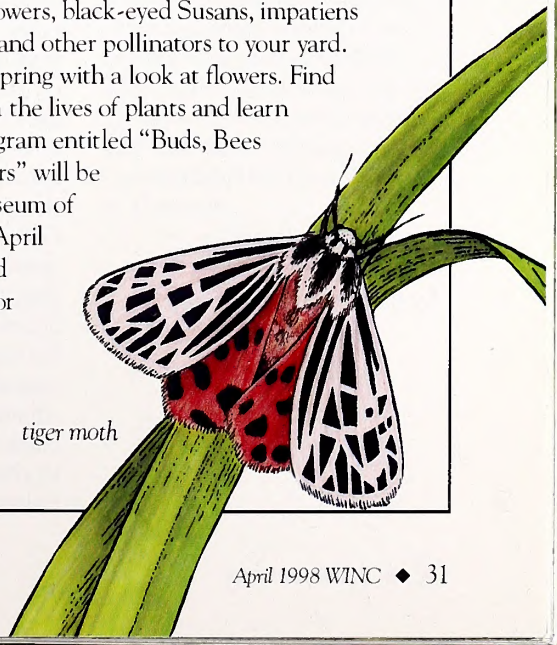
Look at some flowers: Use the diagram on page 28 as a guide: can you find the stamen, anther, pistel and pollen? Can you find flowers that have landing platforms for bees or butterflies, and ones that are custom-built for critters that hover?

Watch the bees and bugs: If you are quiet and still, you can get quite close to insects as they feed. Observe how a bee manipulates the petals of a flower. How does it land and hold onto the flower? When you watch a butterfly or moth feed, can you see its proboscis?

Attract hummingbirds: Placing anything red in your yard (even a ribbon or hat) will attract hummingbirds in the spring. Be prepared to feed them with a hummingbird feeder. Or better yet, plant some of their favorite flowers: columbine, cardinal flower, fuchsia, coral bean, fire pink and Indian pink.

Plant flowers: Daisies, cone flowers, black-eyed Susans, impatiens and spiderwort will attract bees and other pollinators to your yard.

Visit the Museum: Celebrate spring with a look at flowers. Find out why flowers are important in the lives of plants and learn how they attract animals. A program entitled "Buds, Bees and Blooms: A Festival of Flowers" will be presented at the N.C. State Museum of Natural Sciences in Raleigh on April 5, 12, 19 and 26 from 2-2:30 and 3-3:30. All programs are free. For more information, call (919) 733-7450.



tiger moth

Wildlife Commission Sets Striped Bass Season for Roanoke River

RODNEY FOUSHEE

***Anglers on the** Roanoke River can expect a longer season this spring to catch striped bass (above) thanks to an increase in the harvest quota set by the N.C. Wildlife Resources Commission. The striped bass season opened March 14 and will be closed when 62,700 pounds of fish are caught.*

Written and Edited by Rodney Foushee

Roanoke River anglers will finally be able to reap some of the rewards of a decade-long effort to restore the river's striped bass fishery. Thanks to an increased harvest quota, anglers can expect a longer season this spring to catch striped bass in the river under rules approved by the N.C. Wildlife Resources Commission last month.

Fishing in the Roanoke River Management Area, including the Roanoke, Cashie, Eastmost and Middle rivers and their tributaries, is allowed on Saturdays from 12:01 a.m. until midnight on Sundays and from 12:01 a.m. until midnight on Wednesdays until the season is closed by proclamation by Wildlife Commission Executive Director Charles Fullwood. The recreational harvest quota on striped bass in the Roanoke River was more than doubled from 29,000 pounds last year to 62,700 pounds this year after the Roanoke River/Albemarle Sound striper population was declared recovered by the Atlantic States Marine Fisheries Commission. The Wildlife Commission and the N.C. Division of Marine Fisheries jointly manage the fishery for the state and share in the success of the recovery.

"The striped bass season on the Roanoke River opened March 14 and will be closed when 62,700 pounds of fish are caught," said Fred Harris, the Wildlife Commission's fisheries chief. "That amount is evenly divided between the upper and lower sections of the river to give all anglers a chance at some fish."

As in previous years, anglers can keep three fish per day on the open fishing days with a minimum size limit of 18 inches. From April 1 to May 31 no stripers between 22 and 27 inches may be retained on the Roanoke River.

A new regulation begun last year to protect spawning stripers will remain in effect this year. Only single, barbless hooks can be used from April 1 through June 30 in the waters of the Roanoke River upstream from the U.S. 258 bridge.

Though the spring striper season on the Roanoke River will be closed once the quota is met, catch-and-release fishing remains a viable option through June. Because so many spawning fish will be caught, it is important that all stripers are handled gently and released as quickly as possible.

"We encourage fishermen to handle their catches as gently as possible at all times, whether they're fishing for stripers, mountain trout or largemouth bass," Harris said. "But this is especially important with striped bass because they are more fragile than some of the other fish species."

Anglers are advised to use barbless, wire hooks rather than stainless steel hooks when fishing for stripers for fun. "It is much easier to get a barbless hook out of a fish's mouth than it is to remove a barbed hook," Harris said. "A pair of needle nose pliers can be used to gently shake the hook loose."

Anglers should avoid touching the fish with dry hands and should return it to the water as soon as possible. For deeply hooked fish, cut the line as close to the eye of the hook as possible before releasing the fish. This will allow the hook to dissolve inside the striper. Anglers who can't find single barbless hooks can meet the legal requirements by crimping down the barb of each hook with pliers.

This year's increased harvest quota on the Roanoke River is a positive sign of things to come. "We expect to be able to increase the recreational quota for striped bass in the Roanoke River for the next several years," Harris said. "Plans are also underway to begin restoration efforts for striped bass in other coastal North Carolina rivers including the Neuse and the Tar."

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

April 4

The North Carolina Partners in Flight annual meeting will be held at Blue Jay Point County Park near Falls Lake in Wake County. The event will feature presentations by biologists detailing methods for conserving migratory songbirds. For more information, call N.C. Partners in Flight Coordinator Mark Johns at (919) 852-5124.

April 18

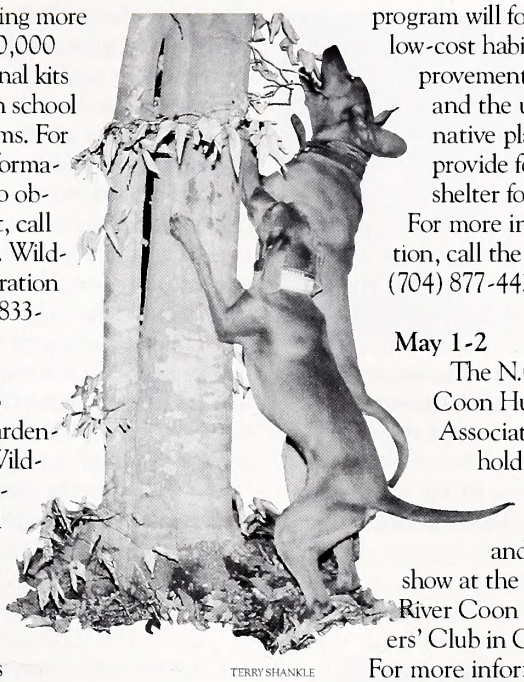
Earth Day 1998 will be celebrated on April 18. Check your local newspapers for scheduled events nearest you.

April 18

An Antique Fishing Tackle Show will be held at the Comfort Inn Conference Center in Burlington. The event, sponsored by the Carolina Antique Tackle Collectors, will feature an assortment of vintage fishing reels, rods, lures and accessories. For more information, call (337) 852-1119.

April 19-25

National Wildlife Week will be celebrated in North Carolina and across the nation. This year's theme is "Nature's Web: Caring for the Land." To promote and celebrate the week, the National Wildlife Federation and its state affiliates are distributing more than 600,000 educational kits for use in school classrooms. For more information or to obtain a kit, call the N.C. Wildlife Federation at (919) 833-1923.



TERRY SHANKLE

April 25

A Gardening for Wildlife workshop will be held at the Wildlife Commission's Pisgah Center for Wildlife Education near Brevard. This program will focus on low-cost habitat-improvement projects and the use of native plants to provide food and shelter for wildlife. For more information, call the center at (704) 877-4423.

May 1-2

The N.C. State Coon Hunters' Association will hold a benefit field trial and bench show at the Neuse River Coon Hunters' Club in Clayton. For more information, contact Ricky Oliver at (919) 477-9625.

The Nature Conservancy Protects Roan Island

A 2,757-acre undisturbed island in southeastern North Carolina has been protected for wildlife habitat and outdoor recreation thanks to the efforts of The Nature Conservancy and the N.C. Wildlife Resources Commission.

In January, The Nature Conservancy purchased 2,132 acres of Roan Island—a nationally significant natural area—from Wilmington-based Corbett Farming Co. The island's remaining 625 acres were donated to the conservancy.

LEONARD LEE RUE, III

***The river otter is just one** of the many wildlife species that calls Roan Island home. The 2,757-acre freshwater island, near Wilmington, will be transferred to the Wildlife Commission this year to be managed as a public game land.*

A $1 million grant from the Natural Heritage Trust Fund was used to buy Roan Island. The conservancy will transfer the island to the Wildlife Commission later this year where it will be managed as a public game land for birding, canoeing, nature study, fishing and hunting. The remote island is accessible only by boat.

The island is located in the Black River floodplain where the Cape Fear and Black rivers meet about 12 miles northwest of Wilmington. The natural area contains an extensive cypress-gum swamp and provides habitat for American alligators, wild turkeys, black bears, white-tailed deer and river otters.

"Roan Island is a real treasure," said Fred Annand, associate director of The Nature Conservancy's North Carolina chapter. "Its biological significance and conservation value are the result of careful management and its isolated location at the junction of a blackwater and brownwater river."

The Black River floodplain harbors 1,700-year-old bald-cypress—the oldest stand of trees in eastern North America—and provides an extensive wildlife corridor for bears, deer, otters and many species of migratory songbirds. The Black River is also home to several species of rare mussels and fish and has been designated an Outstanding Resource Water by the state.

—Information courtesy of The Nature Conservancy

Southern Blazing Star is N.C. Wildflower of the Year

The Southern blazing star (*Liatris squarrulosa*) has been selected as the 1998 North Carolina Wildflower of the Year.

This wonderful Tar Heel native perennial has many garden-worthy attributes. Southern blazing star develops an unbranched, upright flower stalk that grows to 6 feet tall. Its rose-purple flowers, which bloom in late summer or early fall, are arranged in tight heads attached to the main stalk by stems that increase in length toward the plant's base. Mature blazing stars create a strong vertical effect that adds a distinctive element to the garden.

Though it grows easily in the average sunny garden, Southern blazing star is well-adapted for dry areas. Under average garden conditions, the wildflower can be sown anytime in the spring or early summer, but the secret to getting it and other drought-tolerant plants established in very dry spots is to plant in the fall. The relatively stress-free conditions of the fall and early winter give the plant a chance to produce new roots and become established.

A member of the sunflower family, each Southern blazing star flower head is composed of many individual flowers, like those in the center of a sunflower.

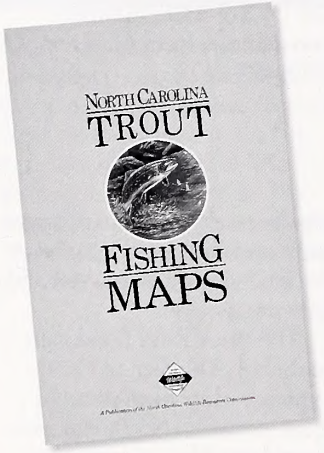
Southern blazing star is attractive alone or when grown with other fall flowering and foliage plants. New England aster, Helen's flower and seashore mallow are just some of the many possibilities to pair with this colorful native wildflower.

The Wildflower of the Year project, now in its 17th year, is a cooperative program between the Garden Club of North Carolina and the N.C. Botanical Garden at the University of North Carolina at Chapel Hill.

For a packet of free seeds and an informational brochure on the Southern blazing star, send a stamped, self-addressed business-sized envelope to: 1998 WFOY, N.C. Botanical Garden, Campus Box 3375, UNC-CH, Chapel Hill, N.C. 27599-3375.

—*Courtesy of the N.C. Botanical Garden*

N.C. Trout Map Book Excellent Choice for Opening Day



With Opening Day of mountain trout season at hand and thousand of miles of varied streams to choose from, most Tar Heel trout anglers must first decide where to go fishing. A copy of the Wildlife Commission's new trout stream map booklet should help anglers make more informed decisions no matter what sort of stream they want to fish.

The North Carolina Trout Fishing Maps book is the first to show all of the state's designated public mountain trout waters. Covering more than 2,100 miles of streams in 25 western counties, maps of each county containing trout streams managed by the Wildlife Commission are presented in a large atlas format. Streams are color-coded to reflect the specific regulations in effect for that stream, and colors match those on signs that are placed at various locations along each waterway.

Each map also depicts game land boundaries, federal lands, state parks as well as major roads and towns. Besides detailing license requirements for fishing in North Carolina's public trout waters, the booklet lists 10 streams and lakes with universal access for disabled anglers. Each entry includes directions to the universal access area and lists improvements—piers, platforms and paved paths—that give disabled citizens a chance at wild and stocked trout.

One thing the map book doesn't do is rate individual trout streams or tell fishermen what species they can expect to catch on each stream. "We wanted to show people where the available trout waters are in North Carolina, but still leave room for anglers to explore the streams on their own," said Jim Borawa, the Wildlife Commission's regional coldwater research biologist.

After last winter's heavy rains, it might take some extra exploration to relocate some traditional fishing holes that were scoured and moved by the heavy volume of water, Borawa said.

The Wildlife Commission charges $12 for the map book to cover production costs. Trout map books are available at various outdoor outfitters and tackle shops across the state. They are also available at the Wildlife Commission's new Pisgah Center for Wildlife Education near Brevard. To order the map books directly from the Commission, use the form below.

Trout Map Book, P.O. Box 29607, Raleigh, N.C. 27626-0607
(Office is located at 322 Chapanoke Road in Raleigh, (919) 662-4377.)

Please send me _____ N.C. Trout Map Books at $12.00 each .$_____
All N.C. residents add $.72 sales tax per map book ..... _____
☐ Enclosed is my check for **total** payment of .....$_____
☐ Charge to MasterCard or VISA for the map book(s) ordered above. My card number is _____ and the expiration date is _____/_____.

_____ (_____)_____
Card holder signature | Day Time Phone No.

Name _____
Address _____
City/State/Zip _____
Phone (_____) _____

Make checks payable to: N.C. Wildlife Resources Commission. All orders must be prepaid. We do not bill. Please do not send cash. Allow 4 weeks for delivery. A $20 charge will be made on returned checks (N.C.G.S. 25-3-512).

Russian Article Inspiring

Dear Wildlife,

Thanks for sharing the recent experiences of "Tar Heels in Russia" (January 1998). What a leap of faith and belief in the value of education that these "Tar Heel missionaries" had to make this program a reality! It is gratifying to know that a number of agencies are collaborating to extend the resources of our great state beyond national boundaries.

This effort is an inspiration to continue environmental education programs in North Carolina. Keep up the good work recognizing those on the front lines!

—Lynne R. Qualls, N.C. Cooperative Extension Service Asheboro, N.C.

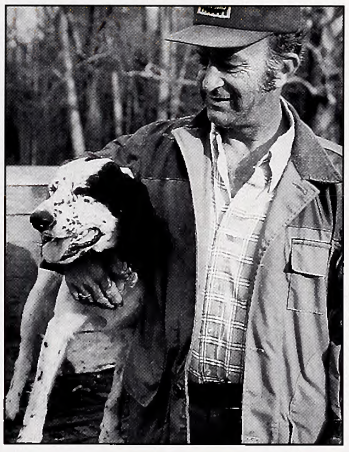
Tribute to a True Outdoorsman

Dear Wildlife,

Lamar Myers was a true North Carolina outdoorsman. There was nothing better to him than to take that almost daily 3-mile trip from his home to his Piedmont farm. During the winter he was accompanied by his English setter or pack of beagles. During the rest of the year, he worked with his vegetable crops. He planned his farm so there was always wildlife habitat. Fishing was another of his passions, whether it involved a carefully planned trip to the coast or a spur-of-the-moment trip to a local pond. He knew exactly how to entice a giant bluegill to hit a white popping bug. Being outdoors and working the land greatly improved his life.

He loved North Carolina. He loved his family. He loved his friends. He was a quiet man, easy-going, and loved to share his knowledge of the outdoors with anyone who showed interest.

He was always optimistic during his illness. Strangely, or maybe not so, his setter and two of his three beagles died a few weeks before he did. Maybe they died of grief because he was unable to spend time with them like he had in the past. He talked of raising one more setter just three weeks before he passed away. He and his loving wife of 46 years had made reservations at the coast for a fishing trip this spring. He had plowed the ground for yet another crop of vegetables, most of which he planned to give away.



***Lamar Myers was** often accompanied by his English setter during his trips to his Piedmont farm.*

Many were touched by this man. His love and knowledge of the outdoors had a big influence on me. You see, I have been a professional wildlife biologist for more than 16 years. Lamar Myers was my dad and he will be missed.

—Terry Myers Cameron, N.C.

Lamar Myers passed away Dec. 15, 1997 after a six-year fight with cancer. He was 70 years young. Terry Myers is a senior wildlife biologist at the Fort Bragg Military Reservation.

Expensive Cameras Not Necessary

Dear Wildlife,

I took particular interest in Derrick Hamrick's wildlife photos in the January issue of the magazine. Being a hobby photographer myself, it wasn't any surprise that Mr. Hamrick has won several awards for his work.

The opening shot of the Southern flying squirrel in the "Caught in the Act" article drew my attention especially since I had recently taken some photos of the same species—in a little different situation. My subjects (at right) are part of a nine-member flying squirrel family that entertain me nearly nightly on my deck. To get my shots, I simply walked out onto the deck, stuck the lens in their fuzzy little faces and fired away with a "point-and-shoot" camera.

Though my photos don't compare to Mr. Hamrick's shots, I want to point out that you can get satisfying photos with inexpensive camera equipment if you take the time to really learn animal behavior. People need not give up trying to photograph wildlife simply because they don't have elaborate photo gear.

***A flying squirrel** family was captured on film by the reader while they fed on his deck.*

—Gary Bartlett Asheville, N.C.

Field Notes

Wild Turkey (bearded birds only)	April 11-May 9
Hatchery-Supported Trout Waters	Opens April 4
Wild Trout Waters	Year-Round

Information on bag limits and other regulations may be found in the *1997-98 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission.

Got a Gobbler?

Call 1-800-I-GOT-ONE
to report your turkey harvest.

**All bearded birds harvested during the 1998 turkey season must be reported via the toll-free telephone reporting system.*

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through January 1998

Principal Balance
$24,836,530.67

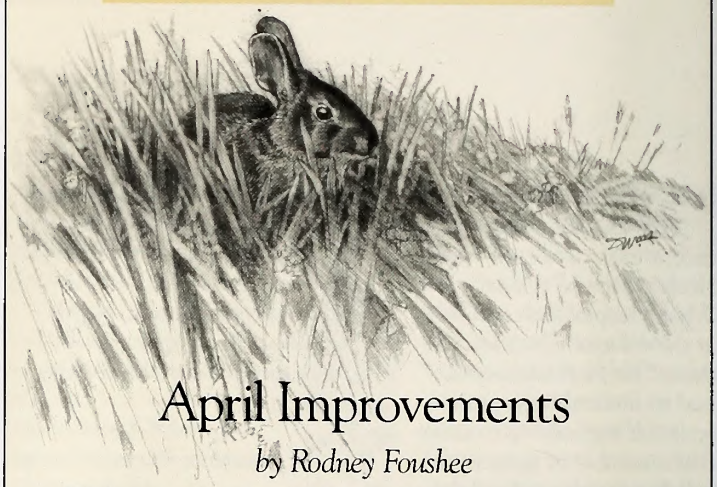
Interest Earned
$25,042,407.08

Total Receipts
$49,878,937.75

Interest Used
$12,329,807.04

Fund Balance
$37,549,130.71

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



April Improvements

by Rodney Foushee

With spring in the air, this can be a busy time for improving fish and wildlife habitat on your land.

Field Borders: Since April is the month when most farmers are busy preparing their fields for planting, it is also an excellent time to leave field edges unplanted for wildlife. By leaving a 30-foot strip of untended land along the edges of woods and ditches, you can go a long way to boost rabbit and quail populations on your farm.

By the early summer, these strips of land will produce a multitude of weed seeds and insects for quail and songbirds to feed on. These weedy field borders also provide good quail nesting habitat and will continue to serve as cover for both rabbits and quail through the winter. By resisting the temptation to mow these field edges and ditch banks, you can create excellent wildlife habitat on your farm for next spring.

Wetland Drawdowns: If you are managing moist-soil impoundments on your property, now is the time to drain them so that desired native plants will flourish and provide rich food and cover for waterfowl and other wildlife in the fall and winter. Though rapid draining will produce positive results, a gradual drawdown over several weeks will promote higher native plant diversity. Both drawdown strategies produce higher seed production when started early, so don't delay. A late drawdown tends to promote undesirable plant species.

For more information about managing wetlands for wildlife, contact your district wildlife biologist or call the Division of Wildlife Management at (919) 733-7291.

Fertilizing Ponds: One of the best ways to boost fish production in a farm pond is to add fertilizer to stimulate plankton, which forms the basis of the aquatic food chain that all fish depend on. Besides increasing food in the pond, a healthy plankton bloom also blocks out sunlight, preventing bottom weeds. Fertilization usually helps if bottom weeds are not well-established and you can clearly see 18 inches underwater.

Fertilizer can be added in April once water temperatures reach 60 F. Usually two to three fertilizer applications, spaced two weeks apart, are required to develop a healthy plankton bloom. Excess fertilizer should be avoided since it can cause noxious algae blooms that die off and rob oxygen during the summer heat. For more information on pond management, call the Division of Inland Fisheries at (919) 733-3633.

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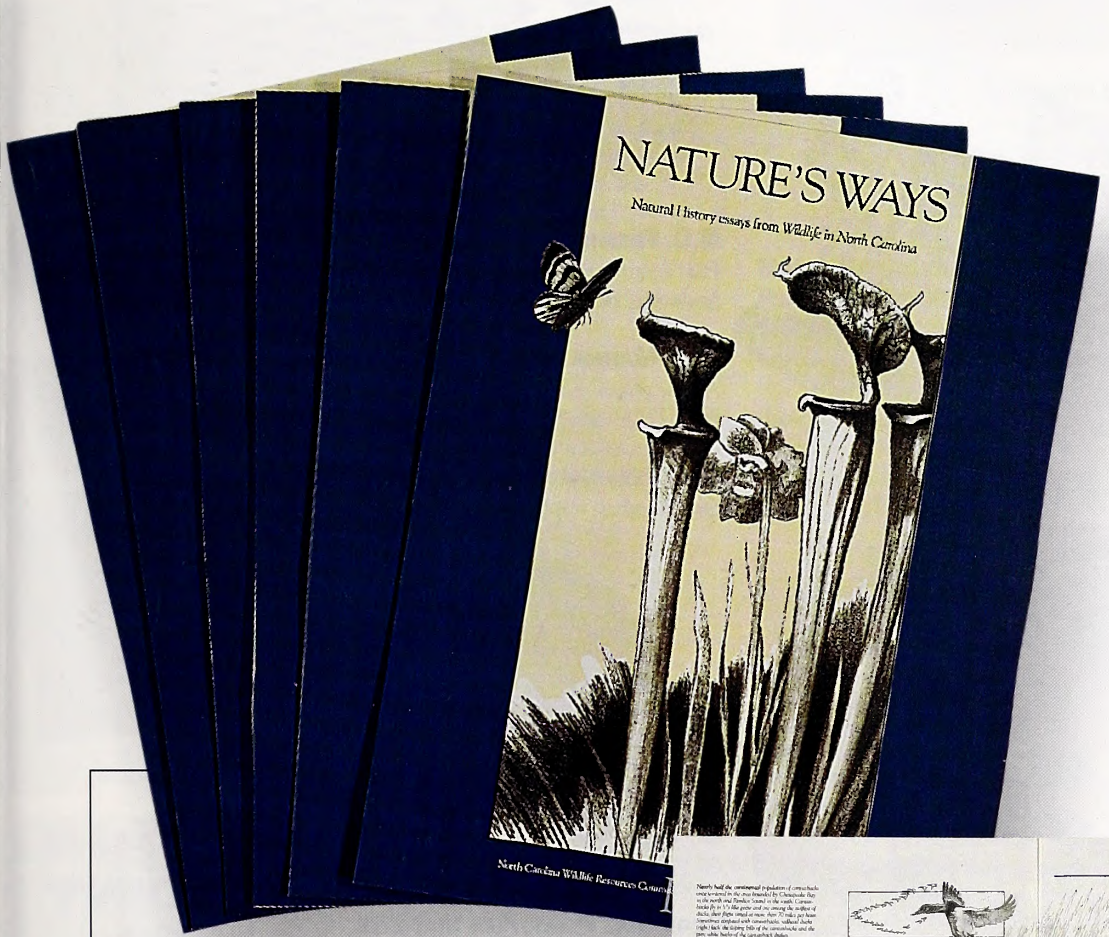

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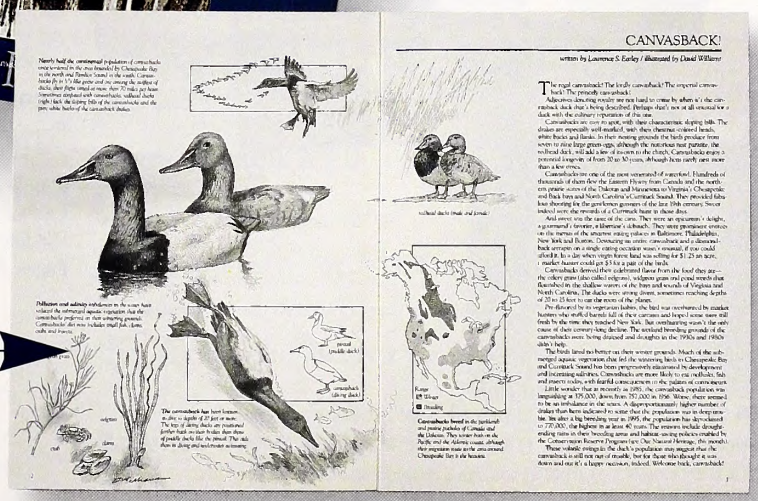

Short essays and beautiful illustrations have been the formula to the popularity of "Nature's Ways" over the years. This article on the comeback of the canvasback duck in North Carolina is one of over 200 articles in the collection. They can easily be photocopied and used in the classroom, and parents and children also can read them together at home.

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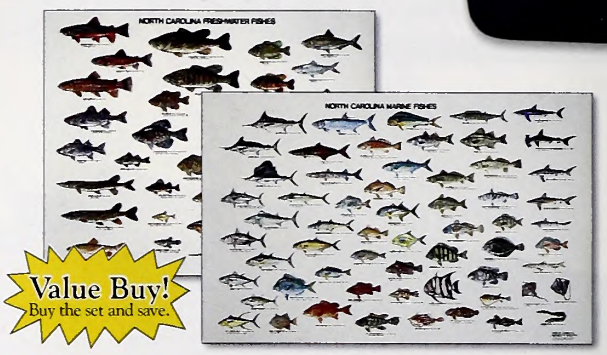

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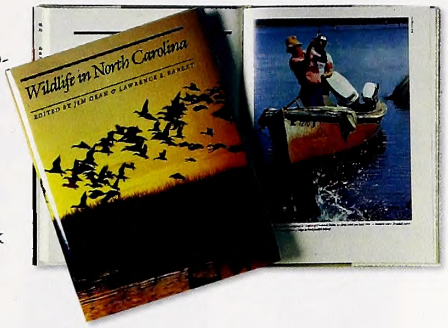

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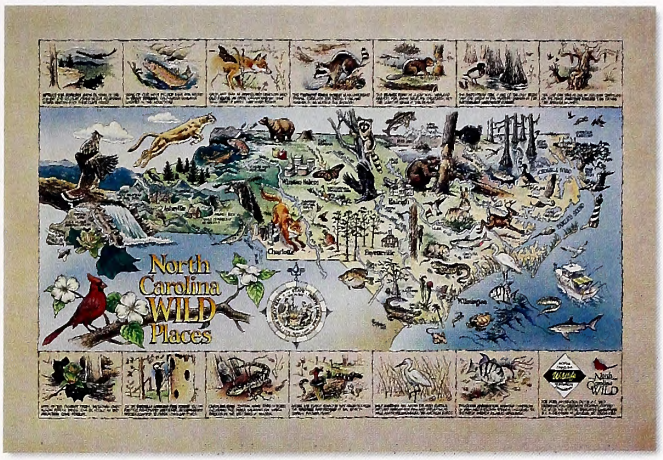

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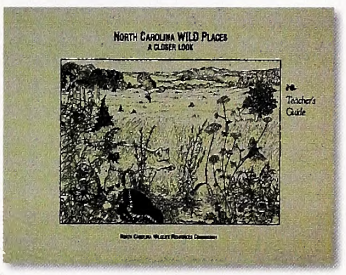

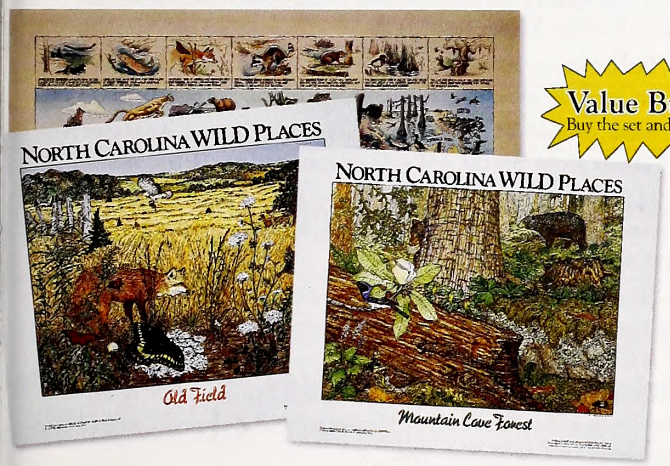

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Stirring 12-minute video adaptation of Chief Seattle's speech introduces environmental ethics. $20.
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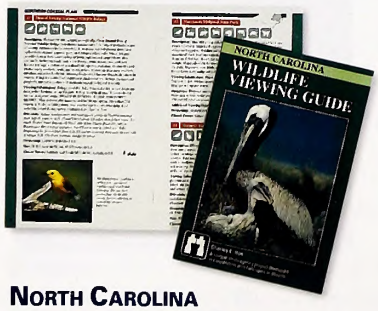

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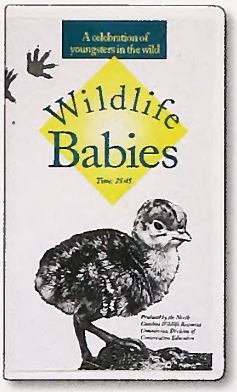

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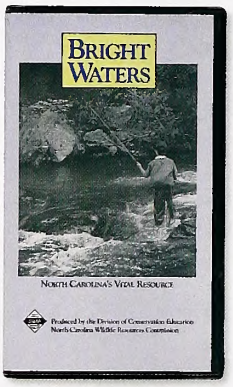

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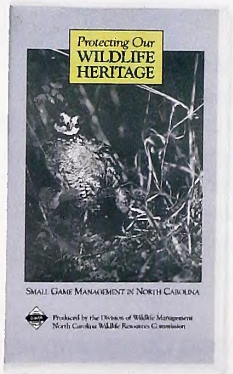

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ENDOW 98

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Office is located at 322 Chapanoke Rd., Raleigh, NC 27603. Telephone 1-888-NCWILDLIFE or 1-888-629-4535.
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A copy of a certified birth certificate (or the mother's copy) must accompany applications for sportsman's licenses for infants and youths.
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Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult at least 21 years of age, who is properly licensed to hunt in North Carolina. "Accompanied" is defined as being able to take immediate control of the hunting device.

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On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or making out a written statement that he had such a license.

Check appropriate block and attach required copy

☐ Copy of Prior Year Hunting License ☐ Copy of Hunter Safety Certificate of Competence

☐ In lieu of copy, I am completing a written statement (complete below).

STATEMENT: I CERTIFY THAT I WAS A LICENSED HUNTER PRIOR TO JULY 1, 1991.

Date _____ Signature of Applicant _____

PLEASE TYPE OR PRINT LEGIBLY

Applicant Name: _____ (First) (Middle) (Last)

Address: _____ (Street/R.F.D.) (City) (State) (Zip)

Date of Birth _____ (Month/Day/Year) Social Security No.: _____ Driver's License No.: _____

Male: ☐ Female: ☐ Telephone Number: ( ) _____ County _____

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Wildlife Commission **Spotlight**

Spring's Gift of Hummingbirds

DERRICK HAMRICK

Lend your support to this effort through a tax-deductible contribution on your North Carolina income tax form or send your contribution to the Nongame and Endangered Wildlife Fund, to the address listed below.

Nongame and Endangered Wildlife Program, N.C. Wildlife Resources Commission P.O. Box 29613, Raleigh, N.C. 27626-0613, (919) 661-4872

NORTH CAROLINA NONGAME & ENDANGERED WILDLIFE FUND

That scarlet flash, that buzz of wings: The first ruby-throated hummingbird may already be in our backyards looking for food after a perilous journey from its winter home in Central America and the West Indies. It is important to have hummingbird feeders up and full by the time the first male hummingbird returns in late March and early April.

A sure-fire mixture to attract hummingbirds:

- Mix one part white sugar with four parts water and boil for one to two minutes to help retard fermentation. Cool the syrup and place it in feeders, storing the unused parts in the refrigerator.

- Avoid using honey in place of sugar; it ferments quickly in the sun and grows a mold that can be fatal to hummingbirds.

- Don't add red dye or food coloring to sugar-water mixtures, as this serves no purpose and may be harmful to the birds.

- Make sure that your hummingbird feeder can be easily taken apart and cleaned.

Tips on providing natural food plants:

- Hummingbirds feed by sight, and seem to prefer but are not limited to red and orange, deep-throated, nectar-rich blossoms.

- For maximum effect, plant a variety of native perennials and annuals. Taller ones should be arrranged behind smaller ones, providing blooms throughout the spring, summer and fall. In addition to producing nectar, flowering plants attract the small insects and spiders that hummingbirds eat for protein and need to feed young.

- Providing hummingbird food plants with feeders as options is the best way to attract the birds to your yard.

The gift of hummingbirds in your backyard can often be taken for granted, but there is a way for you to return the gift. The N.C. Nongame and Endangered Wildlife Program is dedicated to conserving the native wildlife of North Carolina. The sights of springtime depend on us all.

King of the Bays

In its breeding dress, this great blue heron looks regal and self important. The silent stalker is a deadly predator on fish, amphibians and other aquatic organisms found in Carolina bays.

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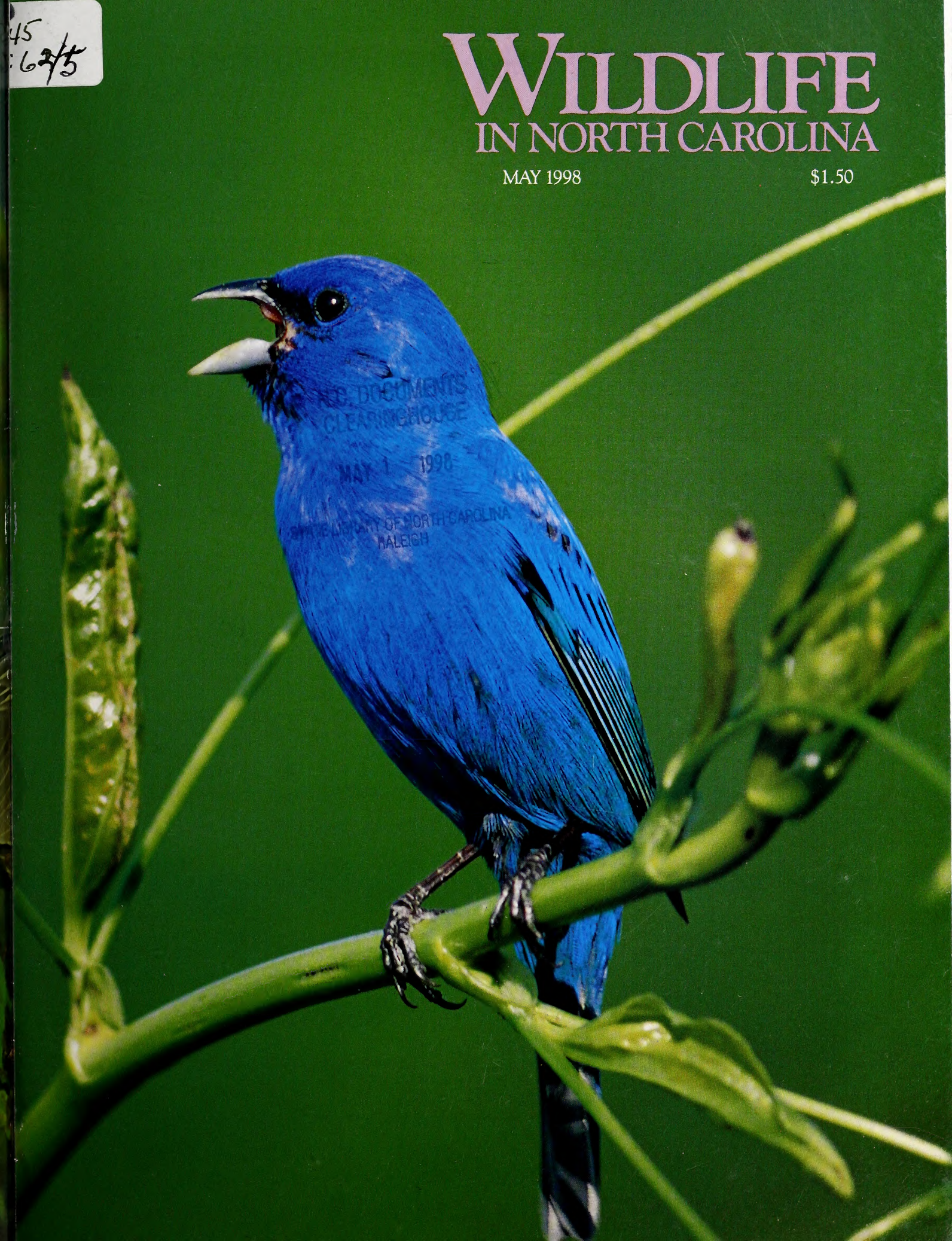
WILDLIFE IN NORTH CAROLINA

MAY 1998 $1.50



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Virtual Fishing

by Jim Dean ©1998

ILLUSTRATED BY JACKIE PITTMAN ©1998

You may not be ready for this, but here goes. There are fishermen these days whose goal is not to catch fish. Furthermore, the best are those who don't catch the most fish. If you're thinking this sounds like one of those new-fangled, sensory-manipulating computer games, you're wrong. These are flesh-and-blood anglers fishing real water, and many are highly skilled professionals who compete in tournaments. Most are trying not to catch bass, but some also concentrate on not catching walleyes.

Been there, done that, you say? No, no. You and I may not catch fish on some of our trips, but we never set out with that in mind. We want to catch fish; that's the whole idea. Not so with these anglers. The more fish they don't catch, the better they like it. Good heavens, I'm making a botch of explaining this. Maybe I better just tell the story.

Two of my closest friends—let's call them Phil and Jack—are serious largemouth bass fishermen, and Phil even occasionally competes in local catch-and-release tournaments. They're constantly refining tactics, and one day last summer I was invited to join them on what they called a practice trip.

"You won't need that net," Phil told me as I carried my gear down to the dock.

"Probably won't need your tackle box, either," added Jack.

"But I've got all my lures in there," I protested. "Oh, I get it. You've got a secret weapon you're going to loan me."

They just smiled and, after we crossed the lake to one of their favorite spots, Phil handed me a deep-running crankbait.

"Wait a minute, somebody took the hooks off this one," I said.

"That's right," said Phil. "It isn't supposed to have any." That's when I noticed the other rods in the boat. All were rigged and ready. None of the lures had hooks.

"Okay, guys, a joke is a joke," I said, laughing. "I suppose the next thing you'll tell me is that we're actually going to fish with these things."

"We are," said Phil. "Tomorrow, I'm going to fish a tournament on this lake, so you and Jack are going to help me. I want to find out where the bass are and what they're most likely to hit, so we're going to fish a variety of lures, types of cover and depths until we find concentrations of bass, especially larger bass."

"You and I may not catch fish on some of our trips, but we never set out with that in mind. . . . Not so with these anglers. The more fish they don't catch, the better they like it."

"But we don't want to actually catch any bass because that might give them the sore mouth or run them off the cover," explained Jack. "By using lures that have no hooks, we can still detect strikes, but we don't really disturb the fish. In fact, sometimes we can even get an idea how big a bass is if it holds onto the lure long enough. As soon as we get several strikes—enough to determine that bass are using an area—we back off quietly and go try another spot."

"If we're lucky, we'll have half a dozen good spots pinpointed before we quit today," said Phil. "Tomorrow, unless conditions change drastically, I should be able to come back to these same places and find fish."

"And then the lures will have hooks, right?" I said.

"You got it," said Jack. "And just to keep it interesting today, we've got a little $10 wager going. The one who gets the most strikes wins the pot. Hey, fishing without hooks is no big secret. Everybody is doing it."

Everybody? I looked around. Bass boats were trading back and forth across the lake, and at least half a dozen had stopped to drift over deep points and submerged humps or road beds. Off to our left, several boats were positioned to fish a flooded forest of standing timber, and others were working along shorelines or probing the edges of willows in the backs of coves. Two nearby boats were apparently waiting for us to leave our spot.

"Nobody in any of those boats is using hooks?" I asked in disbelief.

"Probably not," said Phil. "Not if they're competing tomorrow, and certainly not if they know what they're doing."

So here we all are, fishing prime structure for obliging bass in balmy weather on one of the best largemouth lakes I know. But we're not catching; we're simply fishing. And this is how we'll spend the next eight hours until we tally our takes back at the dock. Still, as the saying goes, I seen my chances.

"I just now had a couple of hits," I announce casually. "Bumped it twice. Felt like a good fish, too. Um, there he was again."

Phil and Jack exchange suspicious looks, but I ignore them. They may be better fishermen, but they're playing to my strength. Besides, I know where $10 will buy a fresh tuna steak.

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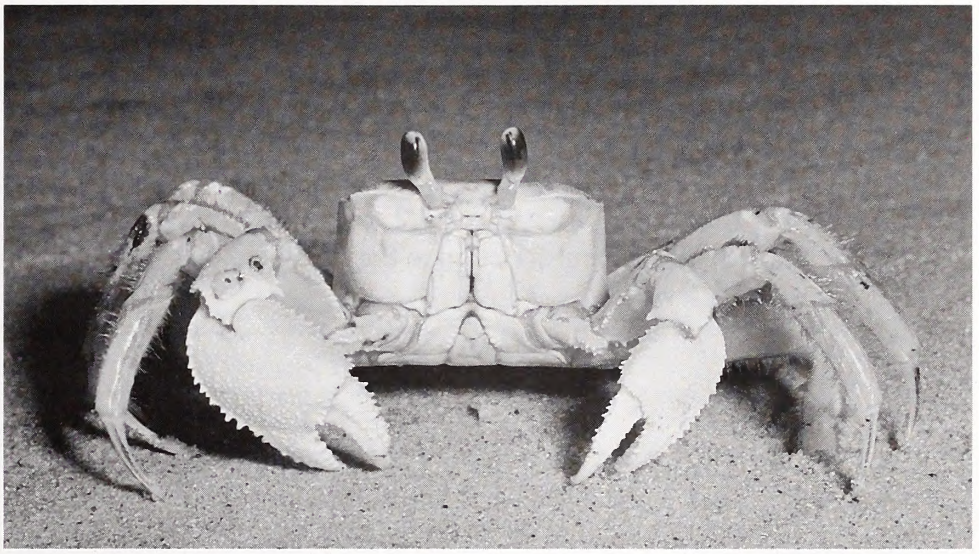

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Contents

Wildlife in North Carolina

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

May 1998 *Volume 62, Number 5*

Features

4 The Tropical Connection
an interview with Mark Johns, N.C. Partners in Flight coordinator
photographed by Maslowski Wildlife ©1998
Partners in Flight has been working to conserve the state's beleaguered migratory birds since 1993. According to the Wildlife Commission's Partners coordinator, there's still a lot to do.

page 22

page 8

8 Fly Fishing for Everything Else *written by Gerald A. Almy* ©1998
Sure you're using flies for trout, but there's a whole world of fish to catch with those woolly buggers, deceivers and zonkers.

14 Little Lakes, Big Fish *written by Dan Kibler* ©1998
photographed by Soc Clay ©1998
Slab-sized Bodie bass have given anglers the best of both worlds—a big, catchable, hard-fighting fish stocked in small municipal waters close to home.

18 A Summer Vacation, Naturally *written by Chris Powell*
You're on vacation and the kids are clamoring for something different. Time for a field trip! Try one of these for an educational diversion.

22 Green River Extravaganza *written by John Manuel* ©1998
photographed by Ken Taylor
While sportsmen may be most familiar with the Green River Game Land, others are just learning about this wild and wet landscape in western North Carolina.

page 4

Departments

page 28

Our Natural Heritage *by Jim Dean* ©1998 ..... **inside cover**
Nature's Ways *by Jeff Beane* ©1998 2
N.C. WILD Notebook *by Consie Powell* ©1998 28
Back Porch *by Rodney Foushee* 32
Wildlife Through the Year *by Rodney Foushee* 36

Cover *This indigo bunting's song is anything but blue. Photograph by Maslowski Wildlife.* ©1998

Wildlife in North Carolina (ISSN 0043-549X) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N. C. and other offices. Subscription rates: one year $7.50, three years $20, Lifetime $100. For subscriptions from foreign countries, payment **only** by U.S. Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks for new subscriptions or change of address. POSTMASTER: Send address changes to Circulation Manager, *Wildlife in North Carolina*, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, call 919-662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the N.C. Wildlife Resources Commission. *Wildlife in North Carolina* is available on cassette tape as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., 1-800-662-7726. **The N.C. Wildlife Resources Commission is an equal opportunity agency.**

The Parasitic Majority

written by Jeff Beane ©1998
illustrated by David Williams

The word "parasite" often generates images of loathsome, detestable creatures, undeserving of our respect (science-fiction movies like *Alien* have done little to discourage such attitudes). But few people realize that "free-living" organisms like ourselves represent a small minority. Even if we ignore viruses and certain kinds of bacteria called Rickettsias (all of which are parasitic), and the innumerable parasitic bacteria and fungi, there are still far more kinds of parasitic organisms than nonparasitic ones. If we find parasites despicable, we may be despising most animals—indeed, most living things. Maybe we ought to take a closer look at parasites.

The parasitic way of life evolved long ages ago. It is so successful that it has developed independently in almost every animal phylum and in many plant groups. Virtually all living organisms harbor at least one type of parasite; indeed, humans and other organisms may host more than a hundred different parasites. It is very unusual to find a creature with no parasites—even animals raised under fairly sterile laboratory conditions usually have them.

Parasitism is a form of symbiosis, which means "living together." There are three types of symbiosis. One in which both organisms benefit is called *mutualism*. Another, where one party benefits and the other neither benefits nor is harmed, is called *commensalism*. *Parasitism* occurs when one organism benefits from the relationship and the other is harmed. Needless to say, it is not always easy to categorize a given symbiotic relationship.

Biologists distinguish among many different types of parasites and also varying degrees of parasitism. Not every parasite is a permanent parasite like lice and liver flukes that spend their entire adult lives in or on their host. Many are temporary or intermittent parasites (like chiggers and bedbugs) which only feed on the host and then leave. Many parasites must spend at least part of their life cycles on or in their hosts. (A good example is the larva of a parasitic wasp.) Others are not normally parasitic but may become so given the opportunity. An ectoparasite (like a flea) lives on the surface of its host while an endoparasite (like a tapeworm) lives inside its host.

Some parasites even host other parasites, a phenomenon that a humorist noted when he wrote:

Big fleas have little fleas upon their backs to bite 'em,
Little fleas have lesser fleas, and so ad infinitum.

Parasites that can only survive on certain host species are said to be host specific. The tapeworm *Taenia solium*, for example, can only mature in humans. Others, like the roundworm *Trichinella spiralis*, which causes the sometimes fatal disease trichinosis, can mature in a very wide variety of hosts.

Some parasites lead amazingly complex lives, passing through several different hosts before completing their life cycle. The most successful ones are usually those that have the least impact on their hosts. After all, if the host dies, the parasite may die with it. When a parasite causes serious injury or death to its host, it is often one that would not normally infect that host species, but happened to enter it accidentally.

Usually, hosts and parasites are of different species, but there are exceptions. Some roundworms parasitize their own species, with the male living inside the female's uterus and feeding on her tissues, and in a few fish species, males parasitize females.

If you still can't shake the notion that parasitism—despite its incredible success and popularity—is an underhanded and dishonorable way to earn a living, consider the fact that much-admired predators such as lions and eagles often steal their prey from a more efficient predator. Meanwhile the unloved mosquito and the lowly leech, both parasites, usually just take what little they need and go.

Those of us who regard free-living organisms as superior should realize that we are all, in a way, parasites on our host planet, Earth. Considering the harm we humans are currently inflicting upon our host, we might well consider ourselves one of the most virulent parasites of all.

Jeff Beane is a curator of herpetology at the N.C. State Museum of Natural Sciences.

Other Reading

- Gerald D. Schmidt and Larry S. Roberts, *Foundations of Parasitology, Second Edition* (The C. V. Mosby Co., 1981).
- William Trager, *Living Together: The Biology of Animal Parasitism* (Plenum Publishing Corp., 1986).

Surfing the Web

- The College of Biological Sciences at Ohio State University maintains a "Parasites and Parasitological Resources" home page containing images of various parasites and listings of parasitological resources. *Address:* http://www.biosci.ohio-state.edu/~zoology/parasite/home.html
- The Parasitology Resources Page contains links to numerous parasitology sites. *Address:* http://www.pasteur.fr/Bio/parasito/Parasites.html
- "Wormland" home page contains information on the anatomy and physiology of several parasitic helminths, as well as useful links. *Address:* http://www.soton.ac.uk/~djab/

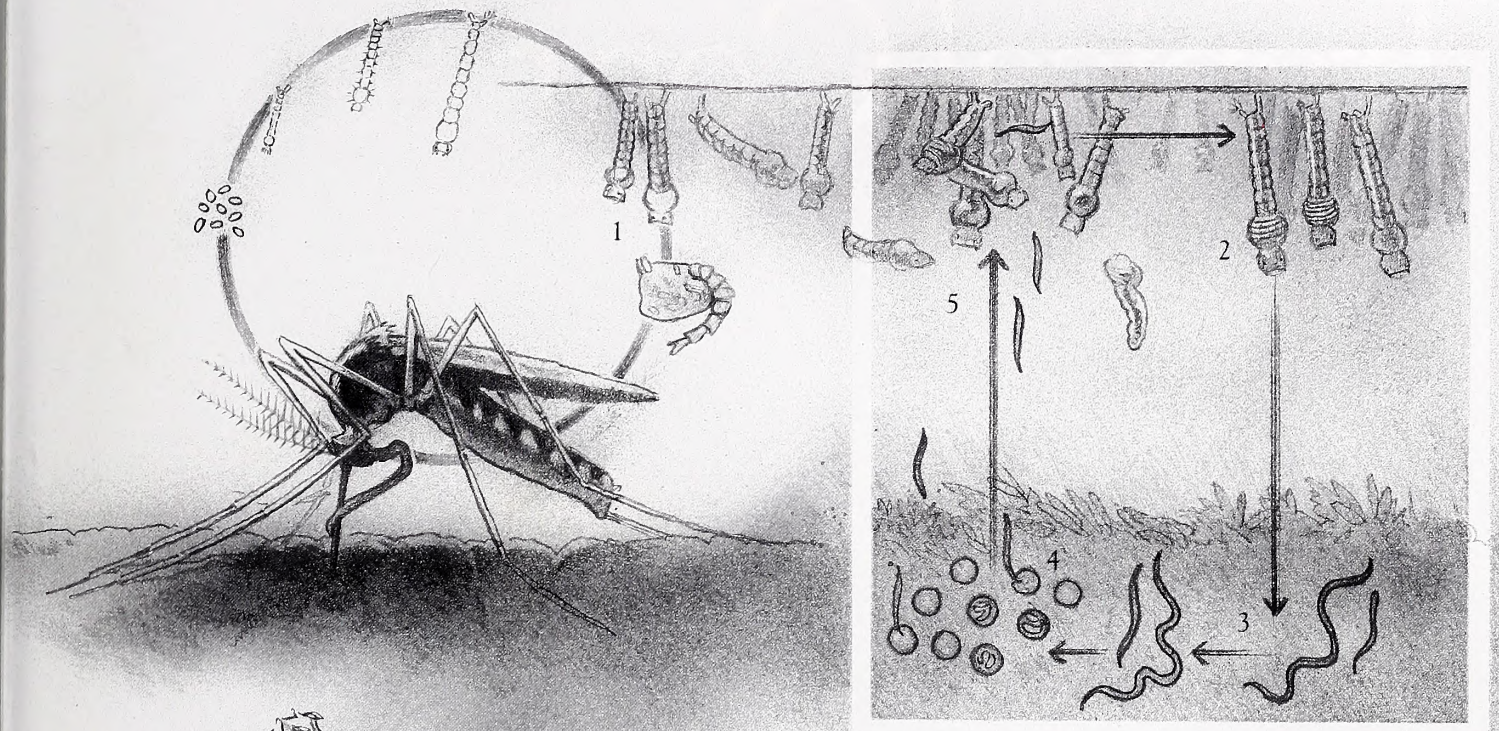
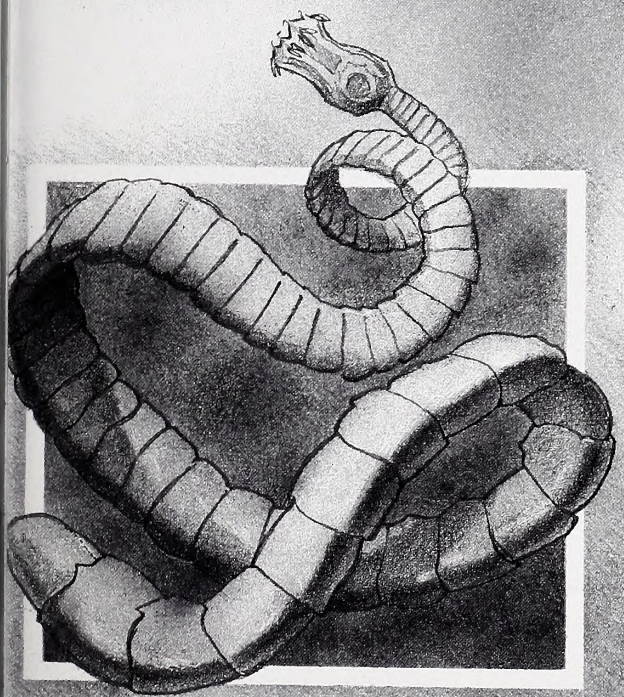
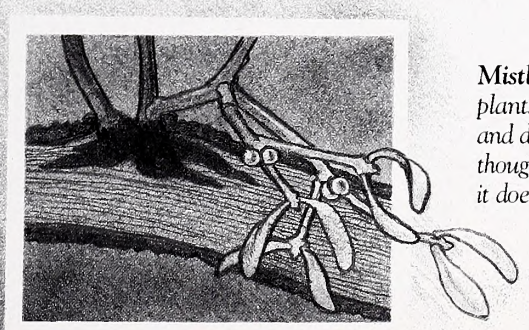


illustration after Vernon Abmadjian and Surindar Paracer, *Symbiosis: An Introduction to Biological Associations* (University Press of New England, 1986).

Even a parasite often hosts other *parasites. After the female mosquito lays its eggs in a pool or other still water, the eggs hatch into larvae that grow through several stages. Normally, the larvae hang from the pool's surface to feed. They change into non-feeding pupae that develop into adult flying forms (1). But sometimes the larva is attacked by a juvenile nematode (2) that enters its body and emerges as an adult (3), killing the mosquito larva. The nematode then lays eggs (4) that hatch into juvenile forms and the parasitic cycle starts again (5).*



Tapeworms are endoparasites, *meaning they live within the host animal. The tapeworm attaches to the intestinal wall of vertebrates, including humans, and grows by adding segments containing male and female reproductive parts.*

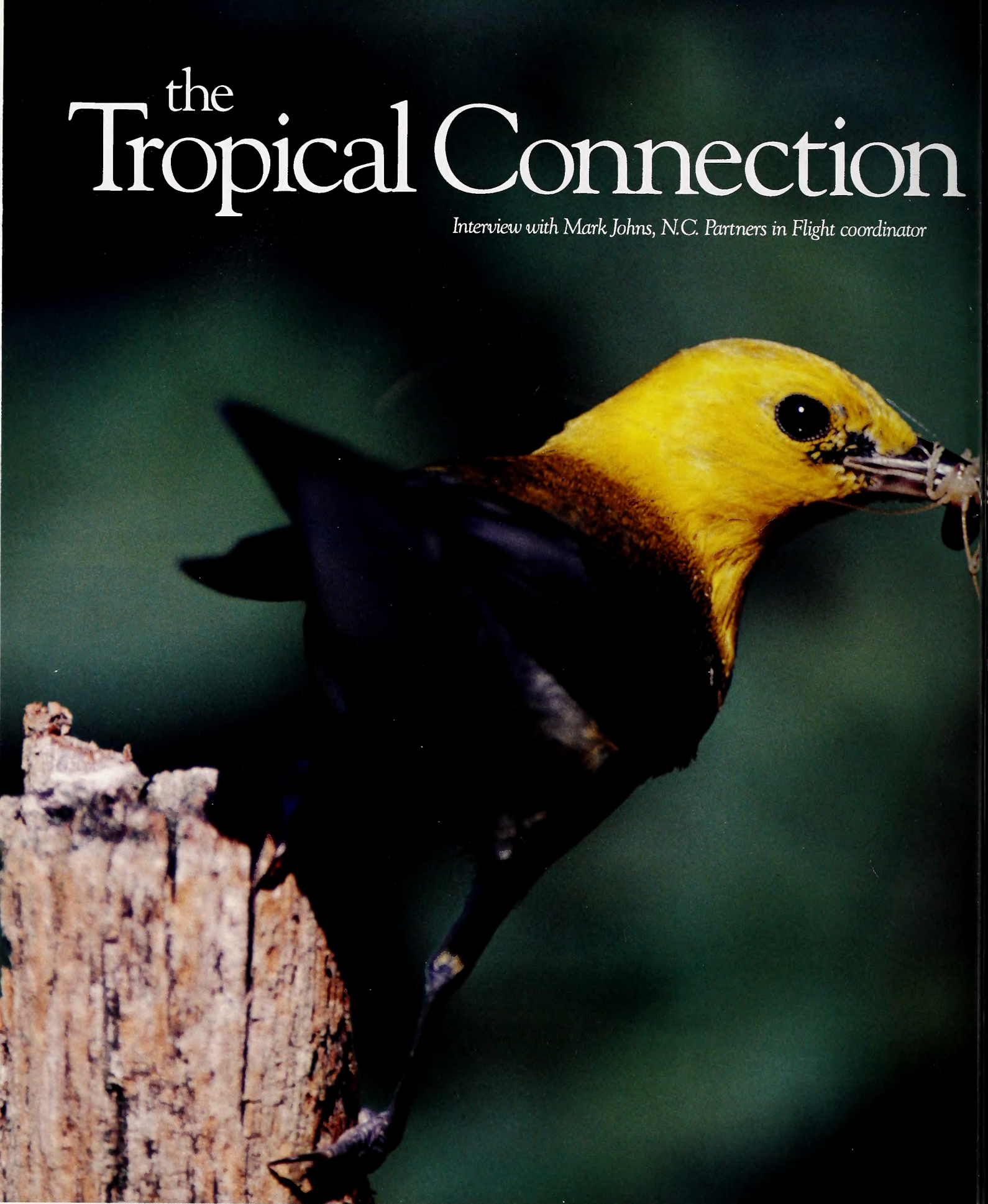


Mistletoe, one of *many parasitic plants, sinks its roots into a tree and draws sustenance from it. But though it lives at the tree's expense, it does not kill it.*

Little bugs have *littler bugs. A tiny water flea (daphnia), little more than a half inch wide, may host an insect fungus that attaches to the flea's intestinal wall.*

the Tropical Connection

Interview with Mark Johns, N.C. Partners in Flight coordinator



Partners in Flight has been working to conserve the state's beleaguered migratory birds since 1993. According to the Wildlife Commission's Partners coordinator, there's still a lot to do.

photographed by Maslowski Wildlife ©1998

The time is here. Can you feel it? Birders throughout the South are enjoying the return of old friends absent since last autumn. The silence and darkness of winter have given way to a cacophony of familiar sounds as neotropical migratory birds pulse through our state headed for northern breeding grounds. Few things in nature evoke our emotional responses like the return of migratory birds from their tropical wintering areas.

This year, there is an extra reason for excitement over these returning neotropical migrants. International Migratory Bird Day events are being held this month to promote awareness of the special needs of these birds and the trials that they face, both here and in points south. (See "For the Birds," p. 7.)

One program has made great strides in recent years in fostering communication and cooperation among those concerned with migratory bird conservation. Partners in Flight was organized in 1990 as part of the National Fish and Wildlife Foundation's Neotropical Migratory Bird Conservation Initiative. North Carolina Partners in Flight started in September 1993, and recently the N.C. Wildlife Resources Commission hired Mark Johns as full-time state coordinator.

Wildlife in North Carolina interviewed Johns recently to get this report about the program and its development.

Wildlife in North Carolina: What is Partners in Flight?

Mark Johns: Partners in Flight's overall goal is to maintain populations of forest and grassland migratory birds throughout the Americas. The tools that we're using to accomplish this goal are habitat protection, management, professional training and education. It's an international program that brings together representatives from many government agencies, nongovernmental organizations, universities and the forest products industry, as well as birders and other concerned individuals, to conserve birds.

WINC: Let's back up a little bit. Why do birds need the help of all these people?

Johns: First of all, it's not all birds. The birds that Partners in Flight is most concerned about are the migratory birds, the neotropical birds that breed in North America and winter in Central America, South America and the Caribbean. These species are the ones facing a troubled future. Various surveys over recent years have shown that many populations have declined seriously.

WINC: What's happened to them?

Johns: That's a difficult question to answer because of the complexity of the problems faced by the birds on breeding, wintering and migration areas. The problem generally has been blamed on loss or alteration of habitat which has greatly accelerated over the last 25 years throughout the Americas. Forests and other habitats are now fragmented into smaller and smaller pieces, and evidently this process has had detrimental effects on certain birds. Predators more easily find nests. Other problems are caused by brood parasites like the brown-headed cowbird, which lays eggs in other birds' nests.

In Central and South America, extensive land clearing for farming and cash crops like coffee continues to accelerate. And loss of habitat comes on top of migration, which has always been an extremely hazardous undertaking. For thousands of years, migratory birds have faced major hazards such as storms, predators and insufficient body fat

A brilliantly colored *prothonotary warbler alights with a cricket to feed its young. These jewels of dark, damp lowland woods even seek out wet, shady areas in migration. The prothonotary warbler is one of only two North American warblers that nests in cavities.*

***Neotropical migratory** birds, like the hooded warbler (above) and red-eyed vireo (below), take advantage of the abundant insects, spiders and other small arthropods of temperate North American summers to feed their young. This vireo's nestlings are brown-headed cowbird chicks hatched from eggs left by the female cowbird, a notorious nest parasite.*

reserves to complete migration. But in recent decades migration has become even more difficult because of the existence of radio, television and cellular telephone towers, skyscrapers, aircraft and other perils that kill thousands of birds each year.

WINC: You talked about Partners in Flight bringing together a large number of people to tackle these problems. Who is involved?

Johns: There are a lot of groups involved in this effort, both government and nongovernment. Many universities are conducting bird research throughout the state, and local bird clubs and concerned individuals all add to the knowledge base that will help address the problems migratory birds are facing.

WINC: Is there any direction to these groups and individuals, or do they all do their own thing?

Johns: There is a steering committee that I chair. My job is to develop state goals and objectives for Partners in Flight and, with the help of steering committee members, implement these strategies to best benefit bird conservation.

WINC: Give us a rundown on what's been happening to promote the work of Partners in Flight.

Johns: Actually, some exciting things have been happening to further bird conservation through Partners in Flight. I've been on the run ever since I took the job. Since a primary purpose of the program is to create awareness about migratory birds among landowners, agencies and private citizens, I've focused on providing information and building partnerships. Since late 1996 I've gone from one end of the state to the other, giving presentations—over 100 at this point—to a variety of audiences on topics ranging from the importance of migratory bird conservation initiatives at landscape scales, to why shade-grown coffee is bird friendly.

Others are helping, too. Thanks to the efforts of volunteer newsletter editor Amber Parker of the Wake County Parks and Recreation Department, a N.C. Partners in Flight newsletter is now produced twice each year. We're producing an N.C. Partners in Flight brochure this year, and fact sheets about neotropical migratory birds are currently being developed.

WINC: Education is important, but what about basic things like population surveys? Do we know enough about how these birds are really doing?

Johns: Not nearly enough. Monitoring has always been an important component of the Partners in Flight effort in North Carolina, and expansion in several areas continues. The Breeding Bird Survey Program in North Carolina has been providing us information on population trends for over 30 years and continues to utilize skilled birders. The N.C. State Museum of Natural Sciences completed a long-term state breeding bird atlas a few years ago, and it continues to serve as the state repository for point count data.

To increase monitoring efforts, I began a training program last year concentrating on bird identification by sight and sound (mostly by sound) and trained over 120 biologists and educators. These training workshops will be held throughout the state again this year,

***The striking male** scarlet tanager is at its brightest during the breeding season. In neotropical wintering areas it resembles the greenish-yellow female. This bird of forested habitats seems to be sensitive to the fragmentation of its breeding sites in North America.*

as well as new workshops targeted for foresters and other land managers. The goal of these workshops is to increase the number of point counts being done in North Carolina, and to create awareness about the importance of migratory bird conservation.

WINC: There are such large forces involved in the decline of neotropical birds—for example, development and population growth. Can education alone really help the situation?

Johns: It can't solve it, but it can really help. A good example, and a big conservation success story, is a memorandum of understanding that was signed in 1998 by N.C. Partners in Flight, the U.S. Fish and Wildlife Service, the N.C. Wildlife Resources Commission, The Nature Conservancy and Champion International to guide management of riparian buffers along the Tar River on Champion land. That might not have happened without the educational efforts we've been doing.

Research is important, too. We've drafted conservation management plans for all three physiographic areas in North Carolina, focusing on the conservation and management of major habitats and priority species, plus what research is needed in each region. Once the plans are approved, research and management can get under way with continued monitoring to evaluate their effectiveness. Adjustments can be made in conservation management strategies as needed, based on what monitoring and research efforts discover.

Partners in Flight is in the process of cataloging ongoing research for a directory and developing priority research needs for the state to help focus ongoing efforts. On the international front, longtime International Working Group chair David Lee of the Museum of Natural Sciences recently won a national Partners in Flight award for his research on winter avifaunal studies and monitoring training in the Bahamas.

WINC: What does the future for migratory birds look like?

Johns: I wouldn't even want to guess. It depends on so many things. But if it depended on our efforts, I think it would be bright. Most of what's been accomplished in North Carolina to further bird conservation has been done by volunteers. I think that's amazing. I'm the only person paid to work directly on Partners in Flight matters. Everyone else has other jobs and responsibilities, but they cooperate in this program because of a shared concern for migratory birds.

Participation in Partners in Flight is open to everyone, and there is something for everyone to do. As Laura White, the supervisor at Hemlock Bluffs Nature Preserve in Cary, said to me after an education working group meeting, 'Everyone needs to put aside their differences and personal agendas to work toward making things better for the birds.' That's something I wholeheartedly agree with. ⊠

For more information on N.C. Partners in Flight, contact Mark Johns at (919) 852-5124.

***Ground-nesting** neotropical migrants, like this ovenbird, face many threats during the brief summer breeding season. An abundance of predators threaten eggs, fledglings and females on nests. Their loud, ringing "TEA-cher, TEA-cher, TEA-cher" song builds in intensity and is often heard in forests with open understories.*

FOR THE BIRDS

International Migratory Bird Day events are being held throughout North Carolina on May 9 and 10. To find out more about these activities, please contact the sponsoring agency.

May 2

San-Lee Park (Sanford). International Migratory Bird Day Celebration, 11 a.m.-4 p.m. Kristin Arnebold, (919) 776-6221.

May 9

North Carolina Zoological Park (Asheboro). International Migratory Bird Day Celebration. Daylong event to celebrate migratory birds and their return. Greg Holiday, (910) 879-7201.

Stevens Nature Center, Hemlock Bluffs Nature Preserve (Cary). Beginning Birdwatching, 11 a.m.-noon. Junior naturalist program for children ages five through eight. Preregistration required. (919) 387-5980.

Wake Audubon Society (Raleigh). Spring Bird Count. John Connors, (919) 733-7450 ext. 602.

Blue Jay Center for Environmental Education (Raleigh). International Migratory Bird Day Celebration, 7 a.m.-5 p.m. Bird-watching field trips, workshops, kids crafts, lectures and more. (919) 870-4330.

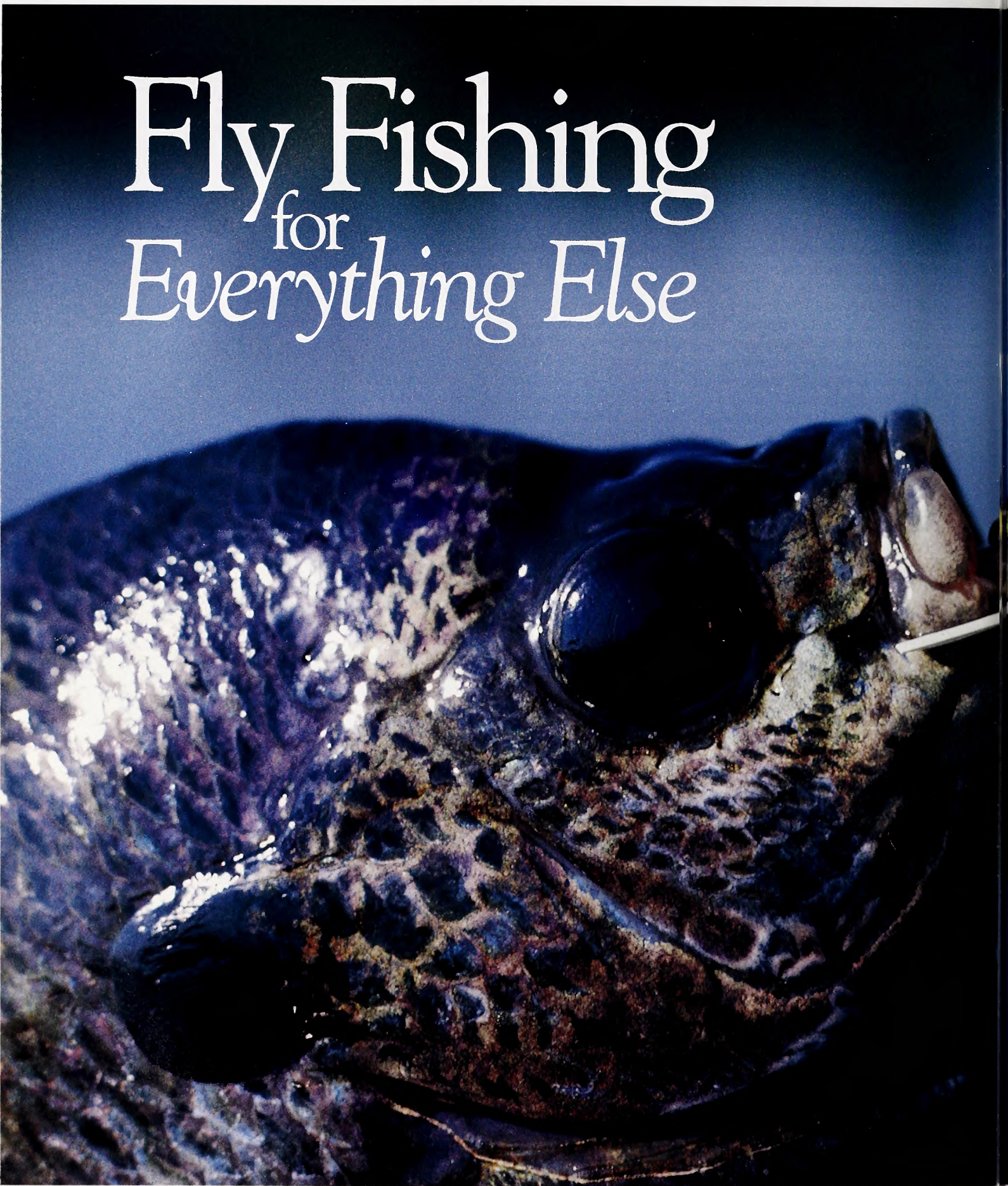
Highlands Plateau Audubon Society (Highlands). International Migratory Bird Day Fest, Second Annual Bird Count, 7 a.m.-5 p.m. Meet at Hudson Library for dinner and social. Write: P.O. Box 698, Highlands, N.C. 28741.

Reedy Creek Nature Preserve and Environmental Center (Charlotte). International Migratory Bird Day, 7 a.m.-5 p.m. Educational displays, birding walks, bird banding, activities and crafts for children, bird vendors, and more. (704) 598-8857.

May 9-10

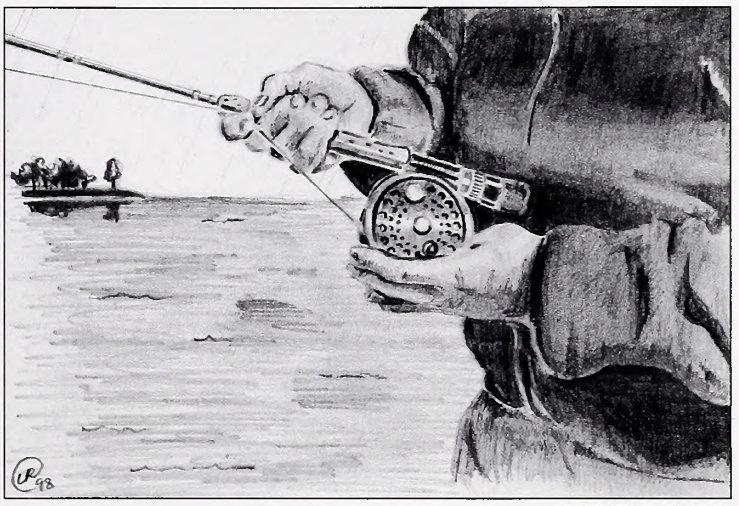
Weymouth Woods Sandhills Nature Preserve (Southern Pines). May 9: National Migratory Bird Count (call for details). May 10, 3 p.m.: Neotropical Birds. Join a ranger to learn what neotropical birds are and why they are important. Bring binoculars and field guides. (910) 692-2167. Web address: weymouth@pinehurst.net.

Fly Fishing for *Everything Else*



Sure you're using flies for trout, but there's a whole world of fish to catch with those woolly buggers, deceivers and zonkers.

written by Gerald A. Almy ©1998



ILLUSTRATED BY LEE RATCLIFFE

Mention fly-fishing and most people immediately conjure up images of sparkling-clear streams, vest-clad anglers, light rods, a jauntily cocked dry fly and mountain trout. But it's time that angling stereotype was tossed onto the trash heap with a lot of other misconceptions.

True, trout fishing represents the oldest, classic form of fly-fishing, but in recent years pioneering anglers have opened up a broad and varied new world to the long-rodder, devising special lines, flies and tactics for taking everything from pickerel to walleyes. Here's a rundown on some popular North Carolina species besides trout and, how to catch them on flies.

Largemouth Bass

Found in lakes, impoundments, farm ponds, Piedmont and tidal rivers, big-mouth bass can be readily taken on flies. Farm ponds are particularly good choices, but I've also had excellent luck in late spring and summer on large impoundments including lakes Gaston, Kerr and Norman. Tidal rivers can offer surprisingly good fly-fishing during summer, and Lake Mattamuskeet is a superb spot for bass on flies.

Tackle: For bass, choose an 8½- to 9-foot rod, a 7- to 9-weight bass taper or weight-forward floating line with a 7½- to 10-foot tapered leader and an 8- to 12-pound tippet. For deep fish and streamers, a fast sinking-tip line and a shorter leader can be useful.

Flies: Deer hair, frog and mouse patterns, cork, balsa or soft foam poppers will take plenty of bass, as will Dahlberg divers, woolly buggers, desperate divers and Clouser minnows, sizes 1/0 to 4.

Retrieve: Cast surface bugs near logs, weeds, shallow flats or spawning fish. Let the bug settle until the surface ripples disappear, then twitch lightly. Wait, then twitch again before pumping back. Fish streamers with split shot or a sinking-tip line with crisp 12-inch tugs and pauses in between. Keep your rod tip low near the water, so the stripping motion is imparted crisply to the fly.

Smallmouth Bass

Found in western North Carolina's rocky mountain lakes and rivers, the smallmouth is a great fly-rod quarry. It feeds heavily on insects, small minnows and crayfish, which can be imitated with easy-to-cast, lightweight flies. In lakes, the best fly-fishing is in the spring; in rivers, summer and fall are tops.

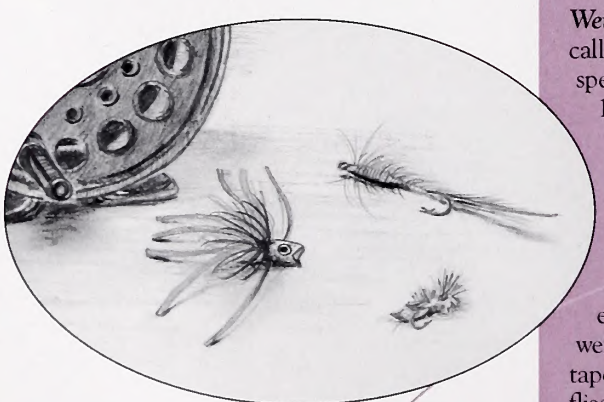
Tackle: For smallmouths, choose an 8-

***Though they work** fine for trout, flies can also be used to catch everything from bluegills to walleyes if they're fished correctly. Few patterns can beat a rubber-legged spider or sinking fly (left) for taking bluegills.*

JIM DEAN

GERALD A. ALMY

***Denizens of rocky** mountain lakes and cold rivers, smallmouth bass can be caught on flies using a variety of patterns. Some of these include (above in columns, from left to right) cork and foam poppers, deer hair bugs and mice, woolly buggers and hellgrammites, and streamers and muddlers.*



ILLUSTRATED BY LEE RATCLIFFE

Fly-line Basics

The multitude of lines used in fly-fishing can overwhelm many budding fly-anglers. Here are some basic definitions to help untangle all those fly lines.

All fly lines are classified in three ways: by weight, shape and type.

Weight: Heavier weight lines are typically used to cast heavier flies to larger species. Line weights range from 1 to 12 with 1 being the lightest.

Shape: A **level** line has an even diameter over its entire length while a **weight-forward** line starts off thin then bulges to a thicker diameter before tapering to a thin end. A **bass bug/saltwater taper** is a weight-forward line with a shorter front taper for casting large, wind-resistant flies including bass bugs and poppers.

Type: **Floating** lines stay on the surface while **sinking** lines fall to the bottom at various speeds. **Sinking tip** lines are intermediate lines that float except for the tip.

to 9-foot rod and a 6- to 8-weight forward or bass taper floating line with an 8- to 11-foot leader tapering to a 6- to 8-pound tippet. For streamer and nymph fishing, use split shot on a long leader or a sink-tip line and a 4- to 6-foot leader.

Flies: Cork and foam poppers, deer hair bugs and mice are all proven favorites for smallmouths, as are large trout flies including irresistibles, humpies, damsels and caddis patterns, and terrestrials such as hoppers, crickets, beetles and caterpillars, sizes 6 to 12. Also stock streamers such as the Clouser minnow, Zonker, woolly bugger and Marabou muddler, plus a few crayfish patterns and nymphs like the Bitch Creek, Murray's hellgrammite or a bead head pattern, sizes 2 to 8.

Retrieve: For river smallmouths, drop topwater flies into likely pockets, pools and eddies and near shore, rocks and ledges, then simply allow the fly to float. The less you move it, the better. If no strike comes, twitch once, wait, then recast. Fish nymphs dead drift up and across; twitch a bit as the fly swings around on its arc below you. Streamers must sink deep, then be worked with sharp strips of 8 to 12 inches.

Striped Bass

Rockfish were originally caught only in North Carolina's tidal rivers, especially the

***The largemouth bass** is just one of the many freshwater fish species that can be readily taken with a fly rod. Largemouths will strike many types of surface flies including frog and mouse patterns, and large poppers while woolly buggers, divers and streamers can be highly effective for strikes below the surface. This fine bass (right) was taken on a marsh hare streamer.*

JIM DEAN

Roanoke. There's still outstanding fishing there, but now an angler also has a host of inland lakes to choose from, where stripers have been transplanted and thrive. Only a few lakes such as Kerr have natural reproduction, but the fish do well on a put-grow-and-take basis in many other lakes. Stripers are sought after mostly with lures and live bait, but flies can be deadly, especially when the fish are in shallow to moderate depths. This is true virtually all the time in tidal rivers. In lakes, the fish are often shallow in spring and on the surface during summer and fall, when foraging for shad.

Tackle: For striped bass, choose an 8½- to 9½-foot rod with an 8- to 10-weight saltwater or bass taper floating line, as well as a sink-tip line for medium-depth fish and extra-fast-sinking line such as the Super Sink Tip Teeny Nymph line or Orvis Depth Charge for extremely deep fish. Choose a tapered leader of 4 to 6 feet for deep fish and 7½ to 10 feet for surface or shallow water feeders with an 8- to 14-pound tippet.

Flies: Elongated poppers, streamers including whistlers, Clouser minnows, deceivers and other light-colored minnow patterns, sizes 3/0 to 4, will all take striped bass.

Retrieve: Work poppers with a moderate to fast chugging retrieve over shallow points and mud flats when fish are near shore and when fish are busting shad on top. Fish streamers anywhere from a few feet below the surface on a floating line to 15- to 20-feet deep with a fast-sinking line. Usually sharp spurts work best, but also try a steady hand-twist retrieve to simulate a slowly swimming shad.

Chain Pickerel

This is a great game fish that gets far too little attention in North Carolina. It's found in some Piedmont waters but is particularly abundant in the eastern third of the state in blackwater rivers and tannin-stained ponds and lakes. You can catch them any time of year, but late fall through early spring is my favorite period for pickerel. Sometimes I'll begin my search for pickerel with lures or live minnows, then switch to flies if the fish are feeding aggressively or are

GERALD A. ALMY

***Though not considered** a prime fly-rod quarry because they do not feed on the surface, walleyes can be readily taken below the surface with streamers worked deep. The best season for catching "eyes" on flies is late winter and early spring when the fish leave large lakes and concentrate in shallower rivers on their spawning runs.*

concentrated in one area.

Tackle: For pickerel, try an 8- to 9-foot, 6- to 8-weight rod with a bass taper or weight-forward floating line, plus a fast-sinking tip for deeper fish. The leader should be 4 to 6 feet long for the sink-tip, 7 to 9 feet long for the floating line, tapering to a 6- to 10-pound tippet.

Flies: Cork and foam poppers, deer hair frogs and mice, Dahlberg divers, desperate divers, Clouser minnows, zonkers, Matukas, woolly buggers and black-nosed dace streamers are all effective.

Retrieve: If pickerel are holding tight against weed beds or logjams, a popper or hair bug twitched moderately fast over their hiding spots can sometimes draw savage strikes. This is a particularly good tactic on warm, sunny, still days when the fish lie waiting in ambush in thin water. During windy, cool conditions with cloud cover, fish often stay deeper and rove in packs. Go with streamers fished either with a split shot on a floating line or with a fast-sinking tip. Work them in sharp steady strips of 12 to 18 inches with pauses in between.

Walleyes

These tasty, big-eyed fish are found in large lakes such as Chatuge, Cheoah, Gaston, Fontana, Glenville, James, Appalachia and Summit, as well as in several of the state's river systems. The best season for catching walleyes on flies is late winter and early spring, when the fish are concentrated below tailwaters and in rivers where they move upstream out of lakes on spawning runs.

Tackle: For walleyes, choose a 6- to 8-weight, 8½- to 9-foot rod, weight-forward full-sinking or sinking-tip line and 4- to 6-foot tapered leader with a 6- to 10-pound tippet.

Flies: Walleyes will readily strike a variety of flies, including woolly buggers, zonkers, Clouser minnows, Matukas, TeQueelys and Lefty's deceivers, sizes 1/0 to 4.

Retrieve: Walleyes do not feed on the surface (their diet consists almost entirely of smaller fish) so a deep-worked streamer is the way to go. When fishing lakes, wait until your fly sinks 8 to 20 feet deep before stripping the line. On rivers, cast upstream of suspected holding lies so the fly can get down to the fish's level. I've had luck with a strip-and-pause retrieve at times, but a steady hand-twist presentation often works best. Just remember to keep it slow, whatever delivery you use.

White Bass

Found in large lakes such as Kerr, Gaston, Fontana and Norman, white bass also migrate up feeder rivers to spawn like walleyes and stripers. White bass can be readily caught on flies during these mating runs and also when crashing into bait on the surface during summer and fall on lakes.

Tackle: For white bass, try an 8- to 9-foot, 6- to 8-weight rod, weight-forward or bass taper floating or sink-tip line and 4- to 9-foot leader tapering to 6- to 10-pound test.

Flies: White bass will strike small elongated poppers, preferably white or chartreuse in color, when breaking into schools of shad or minnows on the surface. For more hookups, go with streamers including Clouser minnows, zonkers, Lefty's deceivers and similar patterns, sizes 1 to 6.

Retrieve: Work poppers with a lively, chugging retrieve on a floating line. Fish streamers on a sink tip or high-density sinking tip if the fish are especially deep. Work minnow imitations with a moderately paced strip-and-pull retrieve, keeping your rod tip low to the water so the strips are imparted directly to the fly.

Crappies

These fish vie with bass and bluegills as the most popular warm-water species in North Carolina. The standard method is to fish minnows or small jigs under a cork, but using flies can be a nice change of pace. You can find crappies in most of the state's impoundments, medium-sized lakes, some large ponds and a number of Piedmont and Coastal Plain rivers. Fly-fishing for crappies can be good from March through November, with spring best of all.

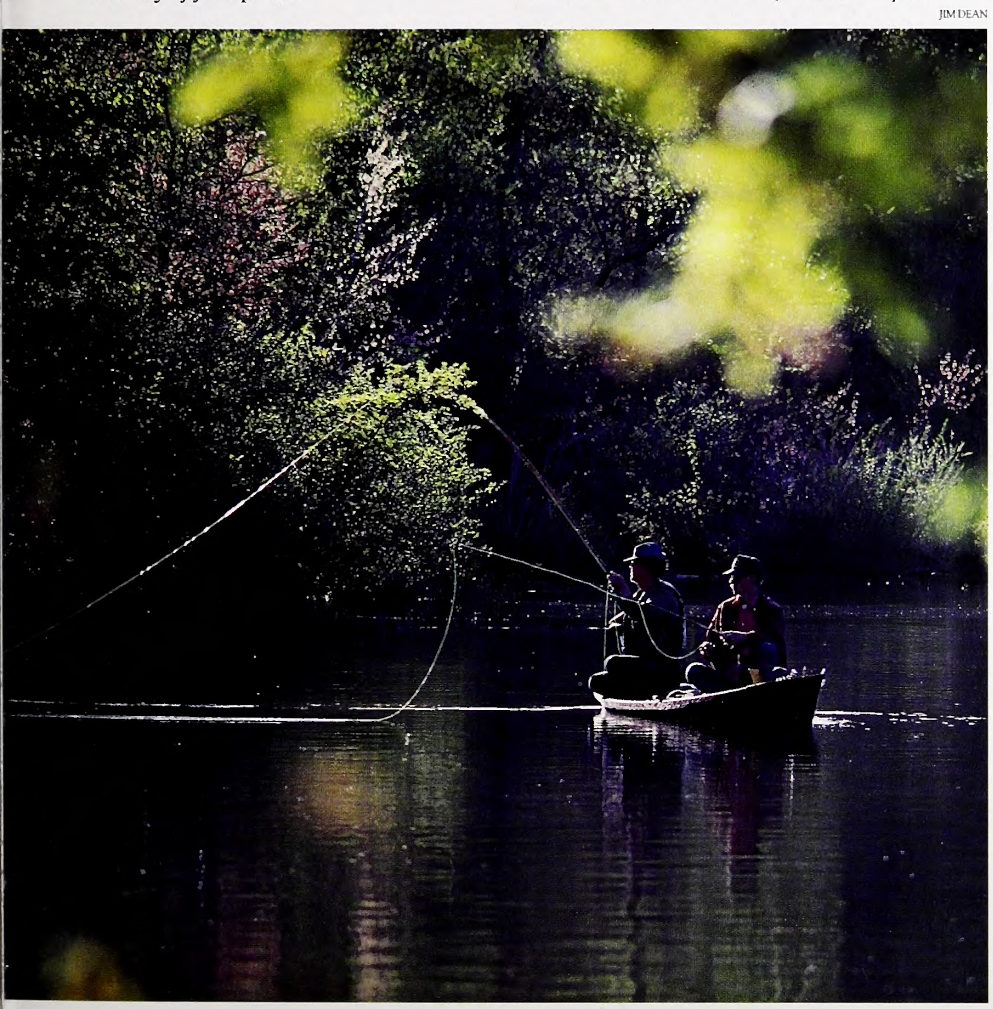
Tackle: Choose an 8- to 9-foot, 5- to 7-weight rod with a weight-forward floating or sink-tip line with a 4- to 9-foot leader tapering to a 4- to 6-pound tippet.

Flies: I always bring along a few small white, yellow and chartreuse sizes 6 to 8 poppers, because sometimes on a calm evening just at dusk or right after sunup, you might find slab-sided crappies willing to sip in a fly on the surface. Generally, though, I use either a split shot on a long leader with a floating line or a sink-tip line and a short leader to present streamers to these minnow feeders. Clouser minnows, zonkers, Matukas, conehead woolly buggers, black-nosed dace and Mickey Finn patterns are good, sizes 2 to 6.

Retrieve: When crappies are shallow at dusk and dawn, try dropping a small popper near stickups and flooded brush and twitching it lightly. At all other times, work streamers at the level fish are holding, with short 6- to 12-inch tugs and pauses or a steady, slow hand-twist retrieve.

***Whether you're fishing** for largemouth bass and pickerel on a blackwater river in eastern North Carolina or smallmouths and walleyes on a mountain lake, a fly rod can be an effective tool for taking a variety of fish species.*

JIM DEAN



Rock Bass

Few people focus on this humble quarry, but the rock bass is a fly-rodder's dream. It's found in a few lakes, but mostly in shallow to medium-depth rivers and streams where it shares the habitat with smallmouths and redbreast sunfish. Rock bass are often found close to shoreline cover in back eddies or slow pools.

Tackle: For rock bass, choose an 8- to 9-foot, 5- to 7-weight rod with a weight-forward floating line. A 6- to 9-foot leader tapering to a 4- to 6-pound tippet rounds out your tackle.

Flies: Cork and foam poppers, grasshopper, cricket, beetle and Humpy trout flies will all take rock bass, as will sponge rubber spiders, stonefly and beadhead hare's ear nymphs, and streamers including woolly buggers, Marabou muddlers, Matukas and sculpins, sizes 4 to 10.

Retrieve: Work surface offerings as slowly as possible, pausing five or 10 seconds after the initial delivery and between twitches. Nymphs can be drifted naturally with the current or pumped gently. Work streamers with 6- to 12-inch strips and pauses.

Bluegills

One of the most popular fish in the country, the bluegill is strikingly colored, a hard fighter for its size, tasty on the dinner table and a ball to catch on flies. Bluegills are found in slow Piedmont and coastal rivers, farm ponds, lakes and even sprawling impoundments. Fly-fishing can be productive spring through fall, with April through June perhaps the best of all.

Tackle: For bluegills, try an 8- to 9-foot rod with a 4- to 6-weight floating line and a 7- to 9-foot leader tapering to a 2- to 6-pound tippet. You can use a sink-tip line and a shorter leader for deep fish, but I usually just crimp on a split shot or two and use the floater.

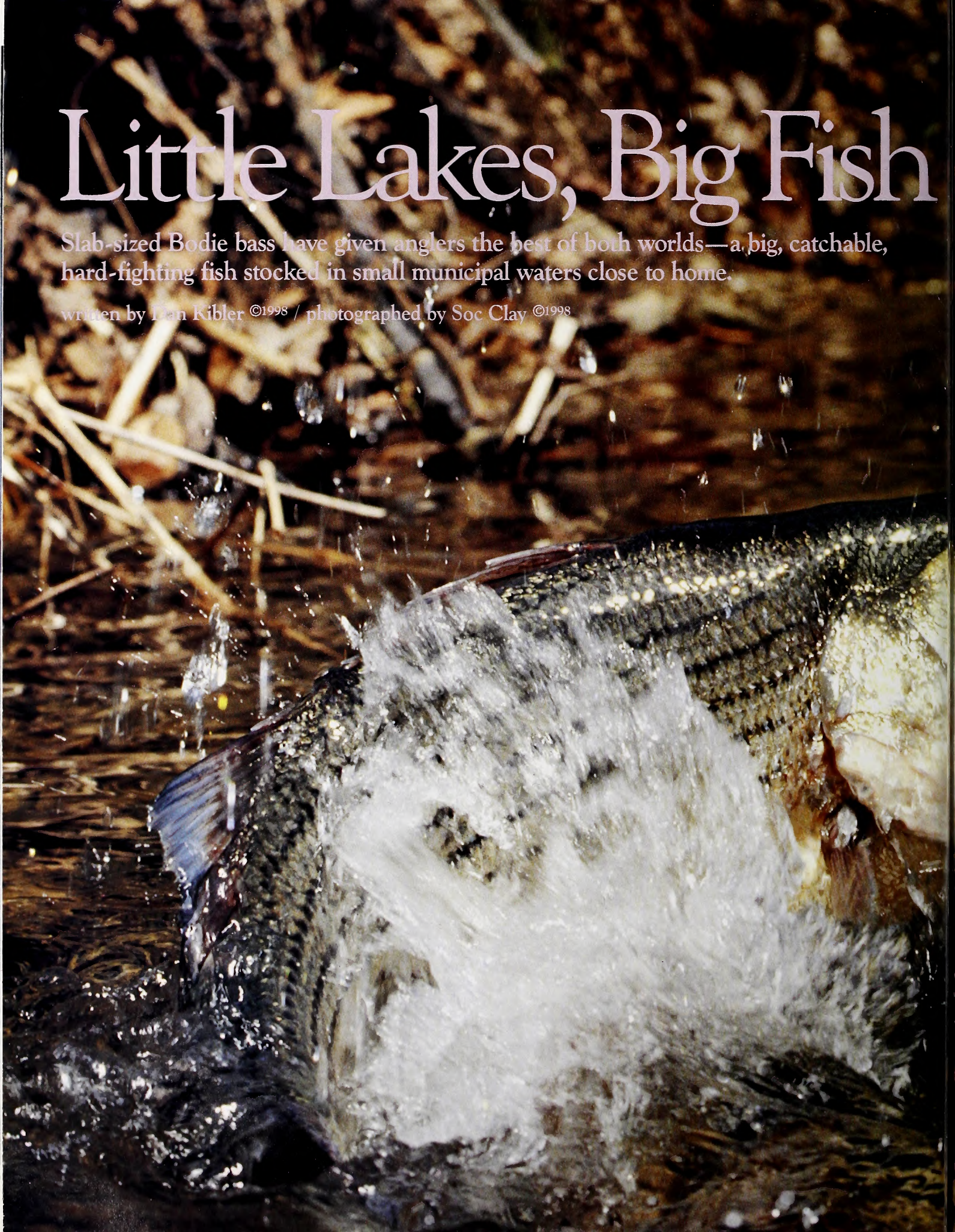
Flies: You can almost get by with just one fly—a sponge rubber spider in green, black, red and white. Sometimes it pays to have other offerings such as a cork or foam popper, terrestrials patterns such as ant, beetle and cricket flies, perhaps a Humpy or Irresistible, wet flies such as a black gnat and woolly worm, plus a hare's ear or pheasant tail beadhead nymph—all in sizes 8 to 12.

Retrieve: Fish spiders, poppers and trout flies by dropping them gently next to cover or over spawning beds, then waiting. The longer you wait, the more likely a strike will come. After your patience wears thin, twitch it once, then wait. You can twitch two or three more times if you like, but usually a strike will occur after the initial delivery or the first subtle movement. Nymphs, wet flies and also sponge spiders with a split shot crimped on the leader are best fished with a slow, hand-twist retrieve, pausing occasionally to let the offering sink deeper. ⊠

Little Lakes, Big Fish

Slab-sized Bodie bass have given anglers the best of both worlds—a big, catchable, hard-fighting fish stocked in small municipal waters close to home.

written by Dan Kibler ©1998 / photographed by Soc Clay ©1998



Ed Pridgen was about to leave Salem Lake one November morning in 1992, ready to put his aluminum bass boat on the trailer and head for his Winston-Salem home. But he was drawn toward one of the aerators that help oxygenate the 300-acre lake, less than 200 yards from the launching ramp—drawn by a few gulls that seemed interested, a few baitfish that were flipping around on the surface.

Pridgen picked up a bait-casting rod rigged with a soft-plastic shad-bodied lure and made a cast close to the aerator.

"I just flipped the bait in there and he grabbed it," he said. "I didn't think it was all that big a fish until I got it close to the boat; it didn't pull that hard until it saw the net. Then, I couldn't get it in. Every time he saw the net, he would really get out of there in a hurry."

Even before he finally wore the fish down and netted it, Pridgen realized that he was about to accomplish a feat that few fishermen can even imagine: He was about to break his own record.

The fish was a Bodie bass, a nasty-tempered, aggressive cross between a striped bass and a white bass. It was 28 inches long and had a 19-inch girth, weighed 10 pounds, 11 ounces and was the biggest hybrid ever caught at Salem Lake, a municipal reservoir operated by the city of Winston-Salem. The previous record, set 15 months earlier, also belonged to Pridgen; that fish weighed 9 pounds, 12 ounces.

He wasn't fishing specifically for hybrids that day, either, just trolling a Rebel crawdad crankbait behind his boat, hoping for a nice largemouth bass, a crappie or maybe even a catfish. His reward was a fish that biologists with the N. C. Wildlife Resources Commission have specially selected for stocking mostly in smaller municipal reservoirs across the Piedmont.

Pridgen's story is not at all unusual. All across the state, fishermen trying to catch bass, crappie and catfish are "accidentally" stumbling on slab-sided Bodie bass that have flourished in smaller bodies of water, where they occupy the same biological niche as their bigger parent—stripers, an open-water predator.

In March 1995, David Dancy of Millers Creek was bass fishing on Wilkes County's 1,460-acre W. Kerr Scott Reservoir when a

***Bodie bass, a cross** between stripers and white bass, were originally stocked in municipal lakes to reduce the number of sunfish. While the hybrid bass hasn't proven as predatory as biologists hoped, few anglers are complaining about the hard-fighting fish.*

***The next time you** cast that large-mouth plug, don't be surprised if it's intercepted by a Bodie bass. When low-lying areas flood, anglers have been successful casting around standing trees where the fish are known to forage.*

14-pound, 6-ounce Bodie bass crushed the small crankbait he was casting into shallow water along a red-clay bank. A half hour later, he and a fishing partner finally wrestled the 31-inch fish into the boat (their landing net had snapped earlier under the weight of the lake-record fish).

"It was like a Mack truck heading down the lake," Dancy said later. "There was nothing I could do but follow him down the lake. We put the trolling motor on high and just chased him. I had 150 yards of 12-pound test on my reel, and he just about pulled it all off."

Those kinds of stories warm the hearts of Wildlife Commission biologists who chose hybrid bass 20 years ago to stock in smaller municipal lakes across the state. Fred Harris, the Commission's fisheries chief, was research coordinator for the Piedmont region when he and Richard Guier, a biologist who now supervises fisheries in the Mountains, came upon the hybrid bass, a cross between stripers and white bass that was developed by biologists in South Carolina and Tennessee in the mid-1960s.

The product of the cross between the two open-water predators seemed, at least on paper, to fit Harris's needs perfectly. It would feed on small sunfish, helping to prevent stunting among the lake's population of bream and shellcrackers; it would grow rapidly; it was extremely aggressive but not hard to catch; it could tolerate warmer, shallower lakes than could stripers; and, most of all, it was a fairly inexpensive fish to raise in a hatchery.

"They were interested in a fish that would possibly help reduce the number of small sunfish in the city lakes, which Fred was managing at the time, and there was evidence that one of the crosses did just that," said biologist Scott Van Horn, now the Commission's Piedmont research coordinator. "If it worked, the average size of sunfish on those lakes would be better, and they'd have a fast-growing, hard-fighting fish that Mr. Average Angler and his wife could go out and catch without having to own $15,000 worth of boat and tackle.

"Hybrids were seen as a management tool for the smaller city lakes, plus being a little flashier than sunfish or bullhead catfish and a lot easier to catch than bigger largemouth bass. They wanted a fish that would be commonly caught at about 2 pounds."

"Later studies showed that they weren't as useful as we thought in eating smaller sunfish," added Van Horn, "but we're still pretty happy about putting something out there that you can catch in fairly good numbers, at a fairly good size."

As a result, hybrids are readily available to fishermen who try their luck on municipal lakes and other smaller reservoirs. Hybrids, renamed "Bodie" bass by the Wildlife Commission in 1988 in honor of longtime Greensboro outdoor writer Walter "Bodie" McDowell, are stocked annually on eight bodies of water at a density of about 10 fish per surface acre. The past several years, about 130,000 fin-

gerlings have been reared at the Watha State Fish Hatchery, near Wilmington, and farmed out for stocking.

The largest lake originally stocked (the Tar River Reservoir and a dozen other Piedmont lakes got the first loads of fish) was W. Kerr Scott on the Yadkin River in Wilkes County. The great majority now stocked are city or municipal lakes: Thom-a-Lex in Davidson County, Oak Hollow Lake in High Point, Lake Townsend in Greensboro, Moss Lake in Kings Mountain and City Lake in Kernersville.

That was about all the Wildlife Commission could handle until it was able to purchase the Watha hatchery in 1993. The huge increase in facilities enabled stockings to nearly double and become more consistent from year to year. This also allowed the Commission to jump-start a fishery in 14,300-acre B. Everett Jordan Lake south of Chapel Hill.

"Jordan is as far east as we're taking 'em," Van Horn said. "At first, we didn't have creel limits on any of the smaller lakes because we figured, 'Hey, we can always make more hybrids,' but we had trouble raising them for a few years. The hatchery in Weldon didn't have much production capacity.

"A lot of the early hybrids we raised were the cross between the male white bass and the female striped bass, but the eggs were adhesive—they clumped together—and when you're trying to culture them in a hatchery, that's not a good thing," he said.

"Some other stuff worked against us at the start; it was hard to make crosses at Weldon because of unstable water conditions, and with hybrids, you can't take forever to grow 'em—the window of opportunity is much smaller.

"With Watha, we're using clean well water, and our production is a lot better."

After Watha was purchased, the Commission upped the number of hybrids stocked at Jordan from 21,000 to more than 75,000, and within three or four years the fishery took off, with catches up to 11 pounds being reported.

Bodie bass carry many physical characteristics handed down from their parents. They have more distinct stripes than white bass, but they are often broken or uneven, unlike the continuous black bars that give stripers their name.

All three bass species carry another identifying mark: patches of teeth on their tongues. Stripers and hybrids have two distinct patches of teeth; white bass have only one. And while white bass rarely make it to the 3-pound mark, a hybrid grows so fast that it will weigh 3 pounds in less than three years.

"I've had 'em in gill net surveys up to 12 pounds," Van Horn said. "That's a nice fish; he spills out of all sides of the frying pan. But initially, the idea was to raise a fish that everybody could catch in the 1½- to 2-pound class, so everybody could have a rip-roaring time. We've presented that attraction in the city lakes, but we've been forced to use a 16-inch size minimum in some places because people wanted to catch bigger fish."

The state record, a 17-pound, 7-ounce lunker, was caught in March 1996 from Lake Chatuge, a reservoir that straddles the North Carolina/Georgia line. Georgia stocks the lake with hybrids. The three previous state records, however, all came from Yadkin River chain lakes, where the species was never stocked. Biologists have long guessed that the fish migrated out of Thom-a-Lex, located on the High Rock Lake watershed, or from W. Kerr Scott, 50 miles upstream from High Rock.

"One thing we learned early on was that you don't put [hybrids] out and expect 'em to stay put," Van Horn said. "If you're stocking hybrids, you're introducing 'em to the entire river system downstream from where you're stocking. They have a terrific desire to go downstream; I guess that's the striper in 'em—the urge to go to the sea and back.

"For instance, a pretty good fishery developed in old City Lake in High Point, which is downstream from Oak Hollow, but we never stocked them in there. And one of the best fisheries in the spring is the Cape Fear River below Jordan Lake."

No matter where you do it, hooking up with a Bodie bass will give you a big-fish, hard-fighting experience that will make the effort worthwhile. ⊠

***Bodie bass are such** scavengers that fishermen catch many of them unintentionally while using rancid bait for catfish. Anglers have also had luck with smaller versions of artificial lures typically used for stripers.*

Catching Bodie Bass

Fishermen have caught hybrids on a wide variety of lures and baits. The earliest and most consistent success, according to Van Horn, belonged to anglers targeting catfish with bloody baits such as chicken livers. Hybrids appeared drawn to the smell as baits drifted close to the bottom in deep water.

But for every Bodie bass caught on something grown in a chicken house, there are fish taken on live shad or minnows, cut bait, and a variety of lures including crankbaits, bucktail jigs and topwater lures. Many striper fishermen target hybrids on the smaller municipal reservoirs, using baits and lures slightly smaller than the ones use for stripers. For example, instead of using 5- and 6-inch-long gizzard shad for stripers, fishermen looking for hybrids often drop down to 3- and 4-inch shad. And instead of a long, topwater stickbait such as a Zara Spook, they use a smaller version such as a Spook Puppy.

Like white bass and stripers, Bodie bass make an upstream spawning run during the spring, moving out of reservoirs into main tributary creeks and rivers, moving into shoals areas, where they release their eggs. Like land-locked stripers, their spawn goes mostly for naught, but it at least puts them in the shallows for part of the year, where fishermen can reach them, even from the bank.

The rest of the year, hybrids are schooling fish, so once they find them, anglers can expect to catch more than one. The creel limit for reservoirs and municipal lakes is eight fish per day with a 16-inch minimum-size limit and a two-fish exemption. In rivers where many hybrids are caught after they move downstream through reservoir dams, the daily creel limit is three fish with a minimum size of 18 inches. On bodies of water where hybrids and stripers coexist, fishermen can take no more than the daily creel limit in total.

A Summer Vacation, Naturally

You're on vacation and the kids are clamoring for something different. Time for a field trip! Try one of these for an educational diversion.

written by Chris Powell

LAWRENCE S. EARLEY

***These children will** remember their trip better if they can name their beach treasures—a skate's egg case (left) and a sand dollar. Such educational field experiences are inexpensive and destined to be relived around the dinner table.*

As the end of the school year nears, many parents are thinking about one thing—the annual family vacation. They'll pore over maps and brochures to decide how and where to spend some of the most precious moments of the year. Reservations will be made, tents patched, suntan lotion purchased and fishing gear dusted off for that annual odyssey into the great unknown.

But even the beach can get boring, which is why it's wise to schedule a day or more for some guided diversion. Scores of parks, aquariums, museums and other organizations can put a spark back into the family vacation. More than just an outing, these trips offer children a chance to discover nature and, in the process, themselves. It could be a child's first encounter with a shy box turtle, an exploration of a salt marsh or a hike through a mountain bald. It could even be an encounter with poison ivy. These are the types of memories likely to be etched into the photo album of a young mind. And while school may be out, the educational process surely continues.

Indeed, Mother Nature is a teacher and she always has a lesson plan ready for the next generation. To help her along, we have assembled a list of places you can take your children while on vacation this summer. There are more than 150 such locations throughout the state and while we can't list them all, most can be found in the *Environmental Education Centers in North Carolina Guide*, produced by the Department of Environment and Natural Resources, Office of Environmental Education. For copies of the guide, contact Linda Millsaps, program manager for the Office of Environmental Education, at (919) 733-0711 (Web address: www.ehnr.state.nc. us/EHNR/ee).

Additional information regarding state parks can be found by calling (919) 733-4181 (Web address: http://ils.unc.edu/parkproject/ncparks.html).

Information for federal parks can be found by calling (202) 208-4747 (Web address: http://www.nps.gov/parks.html).

Have a great summer!

Pisgah Center for Wildlife Education

Location: Transylvania County. To reach the center, take I-40 West to I-26 East to N.C. 280 South to N.C. 276 North.

Profile: To learn about wildlife conservation programs, families can visit the Pisgah Center for Wildlife Education, located near the Pisgah National Forest in Transylvania County. The goal of the center, operated by the N.C. Wildlife Resources Commission, is to promote an appreciation for wildlife with the intent of developing awareness of habitat preservation, said J.P. McCann, the center's supervisor.

"We have an introduction to the geological history of the Blue Ridge Mountains," said McCann, describing the center's interpretive displays. "And then for a general history of the area, we go to an introduction of mountain habitat and how the Wildlife Commission relates to that habitat. And then, as you are walking to the end, there are present-day examples of how the Commission supports our management programs."

A prime example of those programs can be found at the center's fish hatchery. Throughout the summer until Labor Day, the program Raising Trout will be presented daily from 11:30 a.m. to 2 p.m. Visitors can view trout runs, participate in feeding and learn about trout restocking efforts.

The center also has an outdoor exhibit walkway with eight learning stations about wildlife management practices and how they are related to mountain habitats.

Other nature programs include Our Feathered Friends, 1:30 p.m. to 3:30 p.m. June 5; Boating Safety Course, 9 a.m. to 4 p.m. June 6; Trout Unlimited Fly-Fishing Workshop, 10 a.m. to 4 p.m. June 13; Finding Your Way in the Forest, 8:30 a.m. to 12:30 p.m. June 20; Hooves, Claws and Paws, 1 p.m. to 4 p.m. July 18; Splish Splash —Water Quality and Stream Life, 9 a.m. to noon Aug. 3; Hunter Safety Course, 6 p.m. to 9:30 p.m. Aug. 4-6; and Late Bloomers, 9 a.m. to 11 a.m. Aug. 15. Preregistration is required for most programs.

Cost: No entrance fee.

Hours of operation: 8 a.m. to 4 p.m. Monday through Friday, March-May 3; 8 a.m. to 4 p.m. daily May 6-Nov. 30.

Phone/fax number: (828) 877-4423

Web address: www.sips.state.nc.us /Wildlife/ConservationEd

Catawba Science Center

Location: Near Hickory. Take exit 125 from I-40 and follow the Arts and Science Center signs.

Profile: The mission of the center is to further public understanding of science and technology through the use of educational programs, exhibits, teaching collections and activities that emphasize the physical participation of individuals.

Cost: Entrance fees are $2 for nonmembers, $1 for children to age 16 and free for children under age 3.

Hours of operation: 10 a.m. to 5 p.m. Tuesday through Friday; 10 a.m. to 4 p.m. Saturday; 1 p.m. to 4 p.m. Sunday; closed Mondays.

Phone: (828) 322-8169

Mount Mitchell State Park

Location: Burnsville. Take N.C. 128 from Milepost 355 on the Blue Ridge Parkway. The closest access to the Blue Ridge Parkway is from N.C. 80 at Milepost 344, or from I-40 near Asheville.

Profile: The park provides interpretive programs to students of all ages. The highest mountain peak east of the Mississippi River, Mount Mitchell affords opportunities to study plants, animals, climate and geology of a Canadian climate in western North Carolina.

Cost: $10 per night for family camping, $20 to reserve a covered area for grilling.

Hours of operation: 8 a.m. to 9 p.m. June through August; 8 a.m. to 8 p.m. April, May and September; 8 a.m. to 7 p.m. March and October; 8 a.m. to 6 p.m. November through February.

Phone: (828) 675-4611

Great Smoky Mountains National Park

Location: From I-40, take U.S. 19 West through Maggie Valley. Proceed to U.S. 441 North at Cherokee.

Profile: If your family is headed for the high country, then a visit to the Great Smoky Mountains National Park may be in order. Noted as one of the largest protected areas in the East, the park encompasses 800 square miles stretching into Tennessee.

With heights between 800 and 6,634 feet, the park is unique because the varying elevations provide a range of habitats for different wildlife, said Nancy Gray, a park ranger.

"This park in particular is significant because of the extraordinary number of animal and plant species that inhabit the park," Gray said.

Visitors have many opportunities to participate in educational activities with their children. Through ranger-led programs, families can accompany park staff on hikes that focus on topics such as bears, old-growth forests, plantlife and woods safety. In addition, recommended activities include camping, hiking, picnicking, sightseeing, fishing and tours.

The park has no entrance fees; however, front-country and backcountry camping sites cost between $10 and $15 per night.

Hours of operation: Year round.

Phone: (828) 684-7197

New River State Park

Location: Ashe and Alleghany counties. The Wagoner Road access area is located eight miles southeast of Jefferson at River Mile 26. It is reached by S.R. 1590 off N.C. 88, 1.2 miles east of the intersection of N.C. 16 and N.C. 88. The U.S. 221 access area is located eight miles northeast of Jefferson at River Mile 15 and may be reached by U.S. 221.

Profile: Site features include three canoe access areas along 26½ miles of scenic river, primitive camping, picnicking, fishing, a self-guided nature trail and year-round interpretive programs.

Cost: $8 per night for summertime camping.

Hours of operation: 8 a.m. to 9 p.m. June through August; 8 a.m. to 8 p.m. April, May and September; 8 a.m. to 7 p.m. March and October; 8 a.m. to 6 p.m. November through February; closed Christmas Day.

Phone: (910) 982-2587

Most information is courtesy of the Department of Environment and Natural Resources' Environmental Education Centers in North Carolina Guide.

North Carolina Wildlife Federation

Location: Raleigh

Profile: Have you ever wanted to spend the day studying a particular wildlife or environmental issue with an expert in that field? The North Carolina Wildlife Federation, a nonprofit environmental conservation group, offers one- and two-day weekend trips monthly with noted biologists.

Individuals can spend May 2 with Sea Grant biologist Lundie Spence learning about the Cape Lookout estuary. The cost is $22 per person, which will include a mule-train trip to the beach.

On May 30, a backyard wildlife workshop will be held at Blue Jay Point County Park, north of Raleigh. For $20, participants will be instructed on bird feeders, birdhouses, bat houses, butterfly gardens, native plants for wildlife and more.

On Aug. 1-2, Mark Johns, Partners in Flight coordinator with the N.C. Wildlife Resources Commission, will host a field trip on high mountain ecology along the Blue Ridge Parkway near Brevard. The trip will focus on birds, tree identification and habitat issues. The cost is $30 per person.

Also, at a date to be announced, a camping workshop for beginners will be conducted to teach such basics as lighting a lantern, pitching a tent and cooking over a campfire.

Federation members as well as nonmembers interested in participating in these events should make their reservations as soon as possible because the trips have proven "wildly" successful in the past, said Eddie Nickens, editor of *Friend of Wildlife*, the N.C. Wildlife Federation magazine.

Hours of operation: Office hours are 8:30 a.m. to 5 p.m. Monday through Friday.

Phone: (919) 833-1923, 1-800-26-NCWF

Lumber River State Park

Location: Near Orrum. From U.S. 74 travel five miles down S.R. 2225 (Creek Road). Take a left on S.R. 2246 (Princess Anne Road). The park is two miles on the left.

Profile: One of the newest parks in the state, the facility features canoe trips, birdwalks, night hikes, wildflower hikes and environmental educational topics.

Cost: Fees should be established by spring.

Hours of operation: 8 a.m. to 6 p.m. Monday through Friday.

Phone: (910) 628-9844

Carolina Raptor Center

Location: Twenty minutes north of downtown Charlotte in Latta Plantation Park. From I-77, take Exit 16B (Sunset Road West). Turn right on Beatties Ford Road and travel approximately five miles. Turn left on Sample Road. The Carolina Raptor Center is on the left.

Profile: The outdoor visitor areas include a rustic three-quarter mile trail that winds past aviaries housing 22 species of North American birds of prey. Also featured is an outdoor amphitheater for programs and a "weathering area" where presentations about the birds are scheduled on weekends.

Cost: $4 for adults and $2 for students up to college with identification; children ages 5 and under are admitted free.

Hours of operation: 10 a.m. to 5 p.m. Tuesday through Saturday; noon to 5 p.m. Sunday.

Phone: (704) 875-6521

Web address: http://www.charweb.org/organizations/science/raptorcenter/index.html

Reedy Creek Environmental Center

Location: Charlotte. Take I-85 to Harris Boulevard East; travel approximately two miles, turn left on Rocky River Road and travel a half mile. The center will be on the right.

Profile: The facility contains a classroom, small exhibit hall, gift counter and reception area. Exhibits are mostly hands-on, and environmental education programs are available for the general public. The center is located within a 699-acre nature preserve.

Cost: No entrance fee.

Hours of operation: 8 a.m. to 5 p.m. Monday through Friday; 9 a.m. to 5 p.m. Saturdays and holidays; 1 p.m. to 5 p.m. Sunday.

Phone: (704) 598-8857

SciWorks, the Science Center and Environmental Park of Forsyth County

Location: Winston-Salem. Take I-40 Business to U.S. 52 and travel north for eight miles.

Profile: SciWorks is a 31-acre wooded site with a 15-acre environmental park containing paved walking trails; habitat for otter, deer and waterfowl and a demonstration farmyard. The center is a 45,000-square-foot museum with hands-on environmental exhibits and a 125-seat, 150-foot dome planetarium for star shows, film and laser shows.

Cost: $8 for adults; $6 for ages 6 to 19 and senior citizens; free for children under 3.

Hours of operation: 10 a.m. to 5 p.m. Monday through Saturday; 1 p.m. to 5 p.m. Sunday.

Phone: (336) 767-1777

North Carolina State Museum of Natural Sciences

Location: 102 North Salisbury St. in downtown Raleigh, between the state capitol and the legislative building.

Profile: Tired of eating the same old hamburgers, hot dogs and cotton candy while on vacation? If so, your family might enjoy BugFest, to be held 11 a.m. to 4 p.m. Aug. 1 at the N.C. State Museum of Natural Sciences. One of the highlights of this event is Cafe Insecta, which offers culinary delights comprised of what can be considered, well, an alternative food group—arthropods.

"This Cafe Insecta menu includes things like *pest of pasta salad*," said Karen Kemp, the museum's communications co-director. "These are actually gourmet-type dishes. We have *really hoppin' John*, which includes crickets, and *wax worm quiche* with fresh herbs and tomatoes. Then there is the conventional fare, such as the *Carolina low-country crab dip*, because crabs are arthropods."

BugFest, which attracts thousands of people each year, also features activities such as cockroach races, bee handler demonstrations and informational talks given by insect experts.

But if your family is not interested in the creepy-crawlies, not to worry. A free, interactive activity is scheduled daily at the museum, Kemp added.

Cost: No entrance fee.

Hours of operation: The museum is open 9 a.m. to 5 p.m. Monday through Saturday and 1 p.m. to 5 p.m. Sunday.

Phone: (919) 733-7450

Web address: http://www.nando.net/links/museum

N.C. AQUARIUMS

Alligator River National Wildlife Refuge

Location: The refuge is located off U.S. 64 on the Dare County mainland. From the Outer Banks, go west on U.S. 64 or U.S. 264. From Raleigh, go east on U.S. 64 or U.S. 264.

Profile: Red wolf howlings are conducted as staff time allows. Canoe and kayak trips are also available.

Cost: No entrance fees.

Hours of operation: Open year-round during daylight hours. The office is open 7:30 a.m. to 4 p.m. Monday through Friday.

Phone: (919) 473-1131

Web address: www.outer-banks.com/alligator river

Merchants Millpond State Park

Location: The park is approximately 30 miles from the towns of Ahoskie, Elizabeth City and Edenton. Located in Gates County, it may be reached from U.S. 158, N.C. 32 and N.C. 37.

Profile: Coastal pond and southern swamp forest mingle, creating one of North Carolina's rarest ecological communities. Combined with upland forest, these environments create a haven for flora and fauna.

Cost: No entrance fee.

Hours of operation: 8 a.m. to 9 p.m. June through August; 8 a.m. to 8 p.m. March and October; 8 a.m. to 6 p.m. November through February; closed on Christmas.

Phone number: (919) 357-1911

The Nature Conservancy's Nags Head Woods Preserve

Location: About Milepost 9½ in Kill Devil Hills, off U.S. 158. Turn west onto Ocean Acres Drive; the road eventually becomes dirt and the parking lot is on the left.

Profile: The preserve, one of the best examples of a maritime forest along the North Carolina coast, features field trips, guided hikes, birding and kayaking around Roanoke Sound.

Cost: Kayaking trips are $25 per person for nonmembers and $20 per person for members. Also, there is a nominal charge for guided hikes. Children need to be at least 6 years old.

Hours of operation: Open year-round, with hours changing seasonally.

Phone: (919) 441-2525

Web address: http://www.tnc.org

North Carolina Maritime Museum

Location: 315 Front St. in Beaufort

Profile: The museum offers family field trips to coastal habitats, once-a-week programs in the summer called Discover Time (a series of craft activities with a theme), a Cape Lookout studies program and a boatbuilding skills program, which includes ship model building.

Cost: No entrance fee, but varying costs for the programs.

Hours of operation: 9 a.m. to 5 p.m. weekdays; 10 a.m. to 5 p.m. Saturdays, 1 p.m. to 5 p.m. Sundays.

Phone: (919) 728-7317

Weyerhaeuser's Cool Springs Environmental Education Center

Location: Between Vanceboro and New Bern on U.S. 17. Turn west onto S.R. 1434, go 300 yards and turn right on S.R. 1435. Go 2.6 miles and look for a sign on the right.

Profile: The site features guided tours along two miles of forest loop trails, with a focus on forestry management.

Cost: None.

Hours of operation: 8 a.m. to 4 p.m. by appointment only.

Phone: (919) 633-7413

Pea Island National Wildlife Refuge

Location: The refuge is located on the north 13 miles of Hatteras Island. Turn south on N.C. 12 from U.S. 158 or U.S. 64/264. The visitor's center is located 4.5 miles south of Oregon Inlet.

Profile: Pea Island is a typical barrier island habitat with three managed impoundments. Bird walks and marsh programs are conducted with advance arrangements through the office in Manteo. The site also has a half-mile walking trail with spotting scopes, several overlooks and a tower.

Cost: No entrance fee.

Hours of operation: Open year-round during daylight hours.

Phone: (252) 473-1131

Hammocks Beach State Park

Location: The mainland portion of the park is located in Onslow County between Jacksonville and Morehead City. From Swansboro, S.R. 1511 leads to the park entrance adjacent to Queens Creek. From there, the passenger ferry departs for Bear Island. The island is also accessible by private boat or marine taxi service.

Profile: Typically associated with lots of neon, miniature golf and seafood restaurants, some North Carolina beaches have been spared from development to provide a sanctuary for aquatic and terrestrial wildlife. One such location is Hammocks Beach State Park. Visitors can ride a ferry over to 890-acre Bear Island and explore its 3½-miles of shoreline, maritime forests, salt marshes and huge sand dunes.

Kevin Black, chief ranger at the park, said this beach is unique because it remains much like it was when European settlers first set foot on North Carolina's shores more than 400 years ago. "Bear Island is one of the last unspoiled natural barrier islands in this area," Black said. "Not a day goes by that I don't at least see some dolphins off the shore. It's great for birding and shell collecting."

The beach is probably best known as a nesting area for loggerhead sea turtles. Because the turtles are protected, public access to the beach is restricted during nesting periods. However, Black said park staff routinely offer informational presentations that are popular among all age groups.

Cost: No entrance fee into the park; the ferry ride is $2 for adults and $1 for children. Also, primitive camping spots are available for $8 per night.

Hours of operation: 8 a.m. to 6 p.m. September through May; 8 a.m. to 7 p.m. June through August.

Phone: (910) 326-4881

North Carolina Aquariums

Locations:

Fort Fisher—2201 Fort Fisher Blvd., Kure Beach, N.C. 28449; phone: (910) 458-8257

Pine Knoll Shores—P.O. Box 580, Atlantic Beach, N.C. 28512; phone: (252) 247-4003

Roanoke Island—P.O. Box 967, Airport Road, Manteo, N.C. 27954; phone: (252) 473-3494

Profiles: In addition to fish tanks and other marinelife exhibits, the aquariums offer an array of guided field trips to marshes and beaches, live animal presentations, and dredge and trawl trips. A calendar of events can be obtained from each museum, and preregistration for the programs is usually required.

Cost: Varies with the program offered.

Hours of operation: 9 a.m. to 5 p.m. seven days per week, Labor Day through Memorial Day; 9 a.m. to 7 p.m. Memorial Day through Labor Day.

Web address: www.aquariums.state.nc.us/Aquariums/ ⊠

Green River Extravaganza

While sportsmen may be most familiar with the Green River Game Land, others are just learning about this wild and wet landscape in western North Carolina.

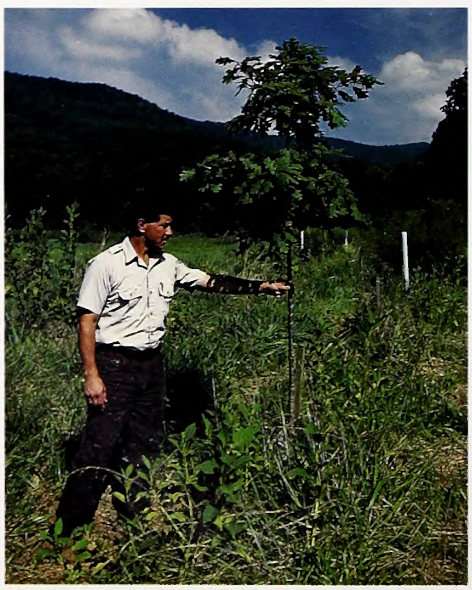
written by John Manuel ©1998
photographed by Ken Taylor

About 25 miles south of Asheville, Interstate 26 begins a winding descent between low hills. The road flattens briefly as it crosses a bridge, then rises again before making the long, dramatic plunge from the Blue Ridge into the South Carolina Piedmont. If you look to either side of that bridge, you will glimpse a landscape refreshingly different from the billboard-lined fields and antennae-topped mountains that surround it. Giant hemlocks and white pines shoot skyward from a dense canopy of hardwoods. The forested hillsides plummet steeply to a valley far below, and anyone with an eye for the wild will sense there's something to be discovered down there. That something is the Green River.

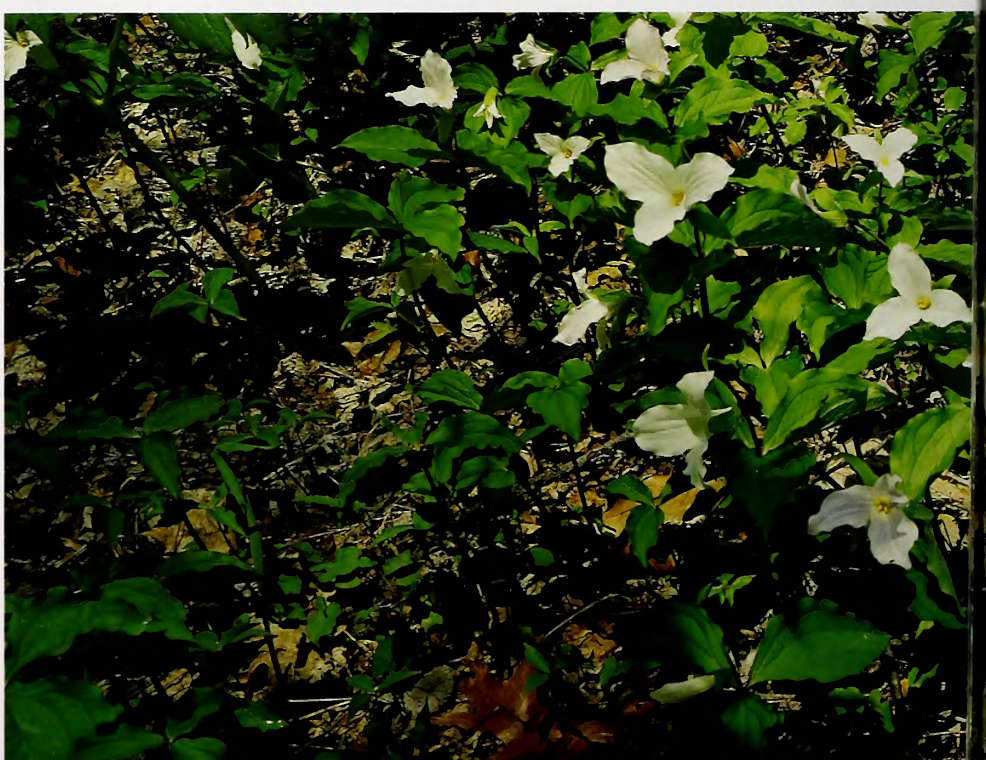
The Green River rises in Transylvania County near the crossroads community of Cedar Mountain. It flows as a clear mountain stream for about 15 miles through woodlands and pasture before slowing to a temporary halt at Lake Summit. The watershed above the lake is privately owned, much of it maintained as near-wilderness by the owners of various summer camps. These camps give members exclusive access to some wondrous parts of the Blue Ridge. But for the average sportsman or woman, the best place to experience the Green lies downstream in the area bisected by I-26. Here the river cuts through the Blue Ridge escarpment, carving a gorge 1,000 feet deep. The rugged nature of the gorge has saved most of it from development, and over the years, the N.C. Wildlife Resources Commission has purchased or leased 20,000 acres of land for inclusion in its game land program.

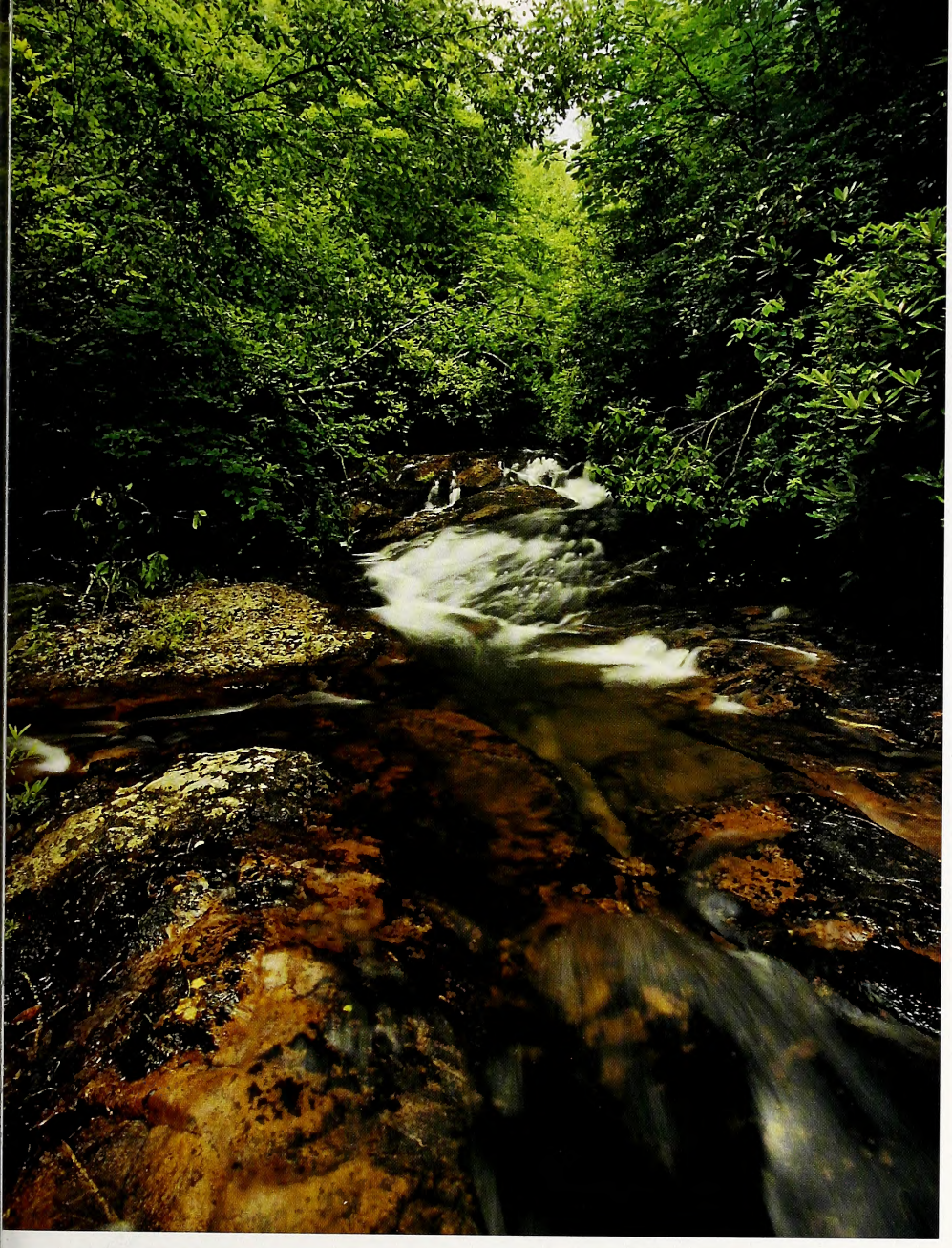
Dean Simon is a wildlife forester for the Wildlife Commission. He is responsible for the western region, stretching from the western Piedmont to the Tennessee line. "I would have to say that Green River is my favorite of all the state-owned lands in the western region," Simon says. "It's got a tremendous diversity of landscape and flora and fauna. With the addition of the Duke Power property, we're still in the process of discovering what's out here."

In 1994, Duke Power Co. and two other

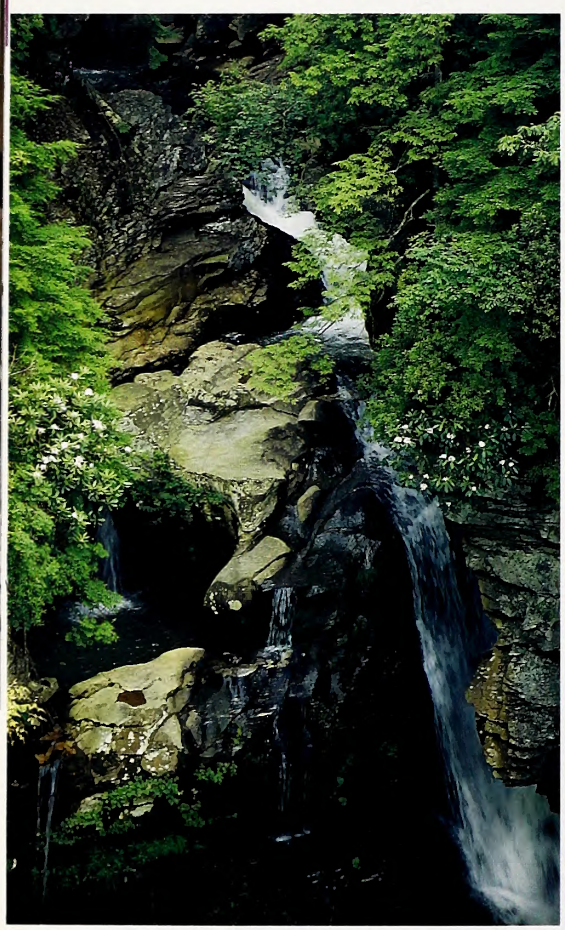


Dean Simon, *Wildlife Commission forester*





Above Lake Summit, *almost in the headwaters of the Green River, lies the Green River Preserve. Shaded thickets of laurel rise above the rocky shelves and bursts of blooming trillium (below) enliven the springtime forest. The Wildlife Commission has bought or leased 20,000 acres of land in Henderson, Polk and Rutherford counties (see map above) for its Green River Game Land.*



Outdoors enthusiasts *enjoy many of the scenic features of the Green River Game Land, including Bradley Falls (bottom), a popular destination for day hikers. Sportsmen enjoy hunting the flocks of wild turkeys (top) that are increasing with the help of Wildlife Commission game managers.*

private landowners sold the state a combined 6,609 acres in the gorge, adding to the 5,558 acres the state already owned there. A survey of the property by a Duke Power consultant supports Simon's impression. Citing several different botanical surveys, the report states that there are 557 different species of plants found in the gorge, 23 of which are endangered, threatened or "otherwise noteworthy." What is most unusual, according to the report, is the combination of Mountain and Piedmont plant species found in close proximity.

"The flora of the Green River represents a unique blend of Blue Ridge and Piedmont flora not known in other gorges and, in fact, not known from any other site in the southeastern United States," the report states.

Recognizing the need to preserve endangered and threatened species, the state has designated nearly 2,000 acres of the game land as a natural area. No logging or other activities that might harm these plants are allowed here. But in the rest of the game land, wildlife foresters have a free hand to manage the landscape in a way that will maximize wildlife populations. To show off a representative sampling of the different topography and management practices going on in the game land, Simon and crew leader Chuck Deyton lead visitors to three different areas.

Cove Creek Natural Area

While the Green River Game Land is managed primarily for the benefit of hunters, trappers and fishermen, other recreational uses are allowed. Hiking is popular in some parts of the game land, although users should understand that on a game land, trails are unmarked and only sporadically maintained. (Game lands do not have personnel assigned to these tasks as state parks do.) A favorite destination of day hikers is Bradley Falls, a 100-foot-tall cascade on upper Cove Creek on the south side of the gorge. The trail is located easily by following Holbert's Cove Road to the point where it crosses Cove Creek.

Leaving the road, we traverse an old orchard and enter the cathedral-like embrace of a cove forest. Poplars dominate the high ground to either side of the trail, while hemlocks and the occasional white pine shade the boulder-strewn streambed. Upper Cove Creek is classified as a natural area and on this spring morning, we are soon surrounded by a profusion of flowering shrubs and plants, including what the locals call punctatum (*Rhododendren minus*), sweetbush (*Caly cantus*), and several species of trillium.

A mile or so along, we begin to hear a growing roar in the valley below. It's a waterfall, a big waterfall. We branch off the main trail and scramble down a path between scorched trunks of mountain laurel (the result of a wildfire). Suddenly, we are at the edge of Cove Creek, yards away from where it surges against a knife-edged pinnacle of granite and tumbles into a shadowy void. It's a scary spot—one false step and you're over the edge—so I'm secretly glad when Simon calls me away to a more distant viewpoint.

We huff back uphill and follow the main trail to a rocky bluff that looks back upstream at the falls. This is a prime photo spot, best visited in the afternoon when the sun illuminates the cascade from top to bottom. Downstream, Cove Creek winds away to the north toward its junction with the Green River in a far different setting.

Cove and River

Zigging and zagging down the south wall of the gorge, Green River Cove Road gives new meaning to the definition "hairpin turn." Once at the bottom, however, the road levels out and straightens as it parallels the Green River through the widening floodplain known as Green River Cove. Much of the cove is private property—houses and trailers are evident throughout—but one needn't look far to find public land.

Simon unlocks one of the trademark steel-pipe gates that prevent vehicular entrance to the game land, and soon we are bouncing along a gravel road and into an open meadow. An ancient wood-frame house stands to one side of the road. This is the Walcott farm, deeded to the N.C. Agricultural Foundation in 1971 for use as a 4-H camp and purchased by the state in 1989. Game land managers are working to keep the former pastures open to provide feeding grounds for deer and turkey. And their efforts appear to be bearing fruit.

"There's a gobbler right there," Deyton says from the backseat of the truck. "See him through the trees?" Just into the woods at the edge of the meadow, the dusky gray

***Populations of wild** turkey, deer, rabbit and other species are benefiting from the Wildlife Commission's management practices. Planted food plots (above) provide a diversity of habitats for wildlife.*

back of a tom turkey appears. He turns his head to reveal a jiggling pink wattle. One by one, the silhouettes of half a dozen hens materialize behind him.

"I'll bet that's the same bunch I saw the other day," Simon says.

We watch the turkeys for several minutes, then move on to the back end of the property. Simon drives past an old log barn and one-room cabin, then across a creek and into a large meadow. We stop beside a neatly planted row of saplings, their trunks encased in white plastic tubing.

"We're planting some oaks and apple trees to provide hard and soft mast for deer, turkey and other wildlife," Simon says. "Voles would girdle the seedlings and deer would browse them if we didn't protect the trunks. It's all part of the attempt to create more diversity in the large fields of this river bottom."

Back on Green River Cove Road, we stop at one of several riverside parking areas maintained by the Wildlife Commission. The Green is classified as hatchery-supported water and is stocked with rainbow trout, as well as supporting a natural population of brown trout. A middle-aged husband and wife stand 50 yards apart on the bank, casting live worms into the swift current. The man, Bob, informs us they have caught only two fish in two days of trying. But serendipity is with us again. Bob's wife gives an urgent grunt and we turn to see her set the hook on what must be a sizable fish.

"Get down here, Bob," she says. "Bring the net."

Bob hurries to her side and wades into the murky water. She works the rod carefully against the combined strength of current and fish. Suddenly, the spotted back of a giant brown trout looms at her feet. It's at least a 4 pounder, too big for Bob's net, but he makes a valiant try at it. For a second, the fish emerges draped over the metal frame, then it jerks, snaps the line and is gone.

"Oh, my God," says Bob's wife.

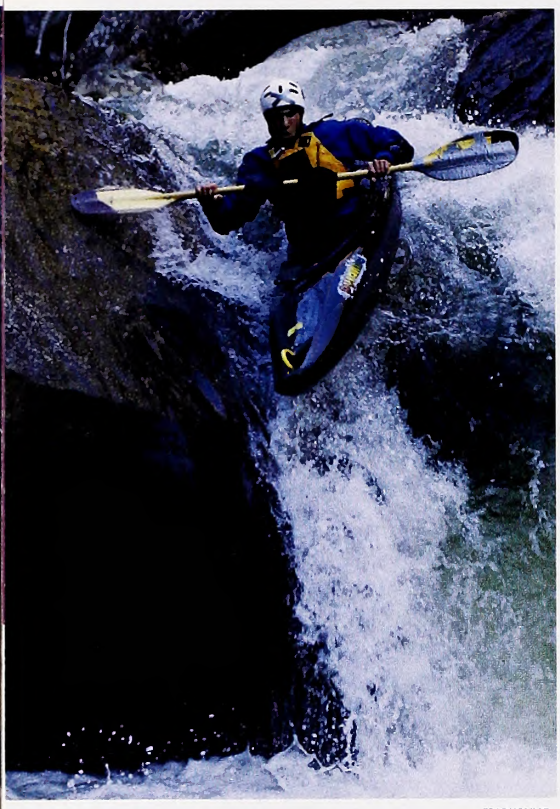
"Baby, I am so sorry," says Bob.

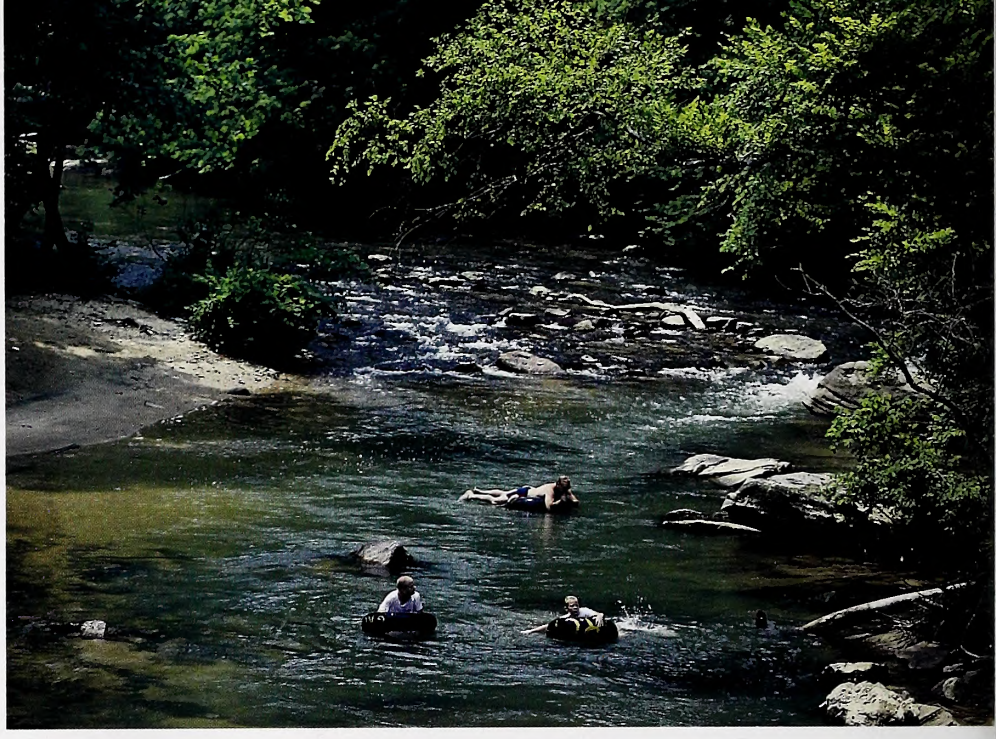
Knowing they will need to discuss this in private, Simon, Deyton and I make a quick exit. "I wouldn't want to be that poor fella," Deyton says.

We head back upstream on Green Cove Road, paralleling what is referred to in whitewater guidebooks as Section 4 of the Green River. This six-mile run through the cove is ideal for canoeing and tubing, with a steady current throughout, a handful of fun rapids in the Class I-II range and easy access in and out. Water levels are controlled by Duke Power's Tuxedo Hydro Station upstream and if the station is operating as it does most weekdays, the water can be run year-round. These factors make Section 4 of the Green one of the state's most popular runs with paddlers who want a taste of whitewater without risking anything more than a dunking. The same cannot be said for the stretch of water upstream known as the Narrows, or in extreme kayaking circles, "The Monster Mile."

It used to be that there were certain stretches of river one never even thought of running—Niagara Falls, the Great Falls of the Potomac, the Narrows of the Green. But whitewater boat designs have changed and so, too, has the mentality of certain practitioners of the sport. There is a new breed of paddlers willing to risk everything for a bigger thrill, for whom no waterfall or rapid is out of the question. In the case of the Great Falls of the Potomac and the Narrows of the Green, they have pulled it off more or less successfully (a kayaker tried running Niagara Falls in 1997 but didn't survive). For that elite group, known as "hairheads," the Narrows of the Green is now considered the ultimate whitewater run east of the Mississippi.

The Narrows lies in a remote section of the game land between the I-26 bridge and Green Cove Road. Access is by trail only,





ERIC YOUNG

***Scenic views, outdoor** recreation and the potential to hunt or view wildlife (lower right) has made the Green River Game Land an increasingly popular place year round. The Narrows (above left) is a premier white-water hotspot for daredevil kayakers, although tubers may prefer some of the Green River's quieter waters (above right).*

so there is virtually no chance that a casual boater will blunder into this stretch of river. Just below its confluence with the Hungry River, the Green shrinks to half its former width, then drops 350 feet over the next mile. There are 11 rapids here in the Class 4-6 range, most coming in quick succession. Any one of these taken at the wrong angle will flip your boat and leave you at the mercy of the raging torrent. Each year, several paddlers are carried out of this section with serious injuries. In short, unless you are an expert kayaker and willing to pay the ultimate price for a mistake, do not attempt it. But for those who have the guts and the skill, the Narrows of the Green is heaven.

Managing the Habitat

Bradley Falls and the Green River may be the best-known attractions in the game land, but the primary reason why the state purchased the land is to provide North Carolinians with a place to hunt. Perched for the most part on steep, heavily wooded terrain, the game land is not naturally con-

ducive to large populations of game. So in a variety of mostly unobtrusive ways, Wildlife Commission biologists are manipulating the ecosystem to maximize populations of deer, black bear, wild turkey and other wildlife species.

Driving along the north side of the gorge on Big Hungry Road, Simon leads me to several areas where he has employed a variety of forest management techniques. Over the years, most of the Green River valley has been commercially logged. Indiscriminate logging is now strictly forbidden on state lands, but Simon says limited timber sales and practices such as prescribed burning can be used to meet the larger management goals of the game land.

We unlock another gate and follow a dirt track up the side of Chigger Ridge. Simon points to the stunted forest characteristic of the dry, south-facing crests of these ridges. The understory is thick with wild blueberry bushes. "We've done prescribed burning on ridgetops like this where there's no harvestable timber," Simon says. "It thins out the laurel thickets, allowing more light to reach the forest floor and promoting the growth of native grasses, legumes and blueberries."

Downhill of the tract, Simon points out a healthier looking stand of young poplar and oak. This forest was commercially logged a few years back at Simon's direction.

"With a commercial cut, I will go in and mark the trees I want taken out," Simon says. "I will leave the den trees and mature hardwoods that provide mast for deer and turkey. Then, we'll manage the forest to allow young oaks to regenerate."

I ask Simon if commercial loggers can be trusted to cut only those trees he has marked. "Oh, yes," he says. "I go in after every cut and make sure I see a paint mark on the stump. If a logger doesn't do the job right, he risks losing his performance bond and probably won't get any more work from us. It's that simple."

We break out of the woods into a saddle that has obviously been clear-cut. The north-facing side has been planted in clover and the south side given over to dense thickets of blueberries and blackberries. Simon is aware of the bad name that clearcutting has among some people, but he maintains there are good ways and bad ways to do it.

"Clear cuts in the game land never cover more than 25 acres and are managed to provide a diversity of browse and cover that would not otherwise exist," Simon says. "Deer need open browse in the spring and summer. Turkey and grouse need open areas to feed on insects. They also need areas with a heavy stem density for cover. If they are out with their chicks and they see a hawk, they can dash into the brambles. Many species of nongame birds and animals also benefit from this early successional habitat."

Reflecting on the progress he's seen, Simon is confident of the wildlife management practices the state has undertaken at Green River. "Thirty years ago, there were very few deer here, now they are much more plentiful. The results with turkey have been even more impressive. When I came here 12 years ago, I only saw a few birds. Now, I can take you several places and just about promise you'll see some.

"Because this is a game land, you can't practice every type of recreation any time you want," Simon says. "But if people will be responsible for the resource and conduct the appropriate activities at the proper times and places, there's a lot to enjoy here." ☒

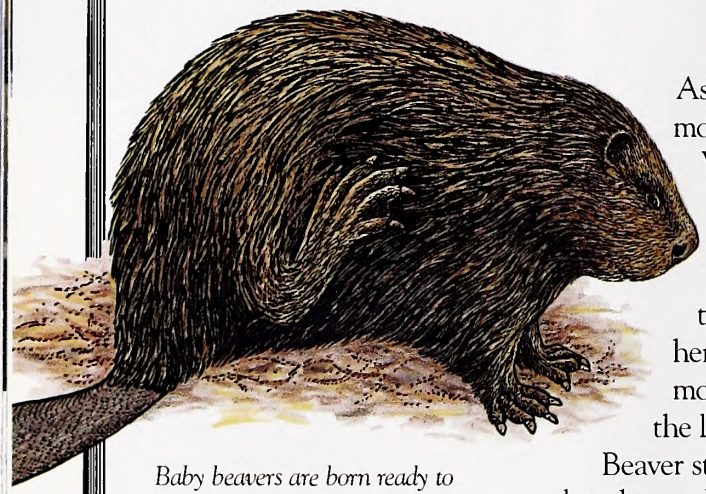
Directions to the Green River Game Land: From Asheville, take I-26 to Exit 28 and either Green River Cove Rd. (SR 1151) or Hobarts Cove Rd. (SR 1142). Or take Exit 22, just south of Hendersonville, to Big Hungry Rd. (SR 1802).

***Wildlife biologists** manage a variety of different habitat types on the Green River Game Land. This field contains apple and other fruit trees, young oaks that are being grown for their mast and different kinds of grasses.*

Get Busy, Beaver!

When night falls, a beaver family starts its day. Join a young beaver and find out how she spends her time.

Written and illustrated by Consie Powell



As the mid-May sun sets behind the Piedmont hills, the big pond is still and quiet. Wood ducks feed near a beaver lodge. A great blue heron swallows a fat frog, then flies away to roost for the night.

Inside the lodge, Beaver awakens. Her two **yearling** litter mates groom themselves as her four baby **siblings** tussle and squeak. Her mother, father and older brother have already left the lodge to **forage**.

Beaver stretches and yawns. With her teeth and paws she combs her dense, sleek fur. She brushes it with the split nail on her hind foot and waterproofs it with a secretion from her **oil glands**.

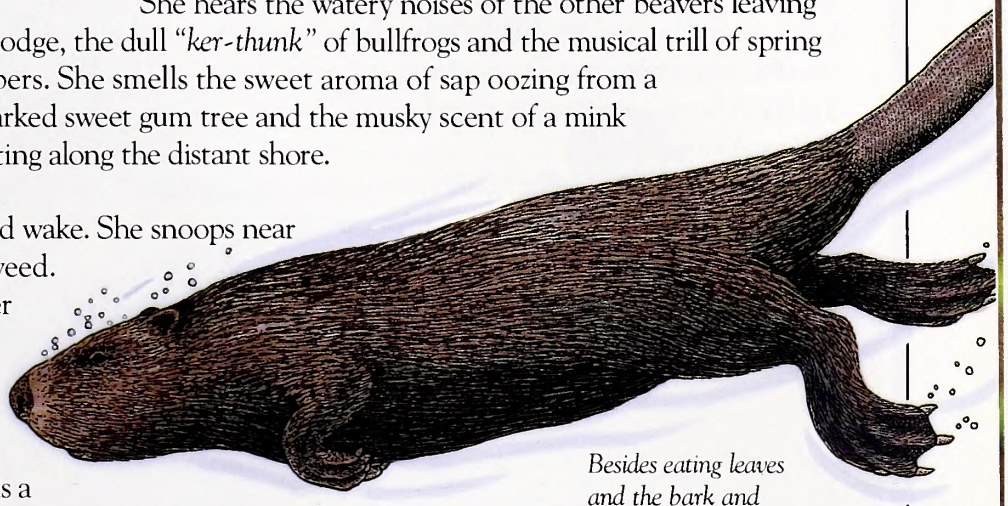
Baby beavers are born ready to go. Their eyes are open, their teeth are in, their bodies are fully furred and they can walk and swim soon after birth. At first they drink only mother's milk, but by 4- or 5-days old they also eat leaves brought to them.

Splash! Into the lodge comes Mother Beaver carrying a mouthful of twigs and leaves. The **kits** scramble to greet her and beg noisily for the succulent greens. One kit tries to nurse, but Mother Beaver has little milk left. The 2-month-old kits are practically **weaned**.

Beaver whines and begs for food. Mother Beaver lunges and huffs at Beaver. A yearling is too old to be fed by its parents. Beaver slips into the underwater tunnel between the lodge and the pond. She can find a meal on her own.

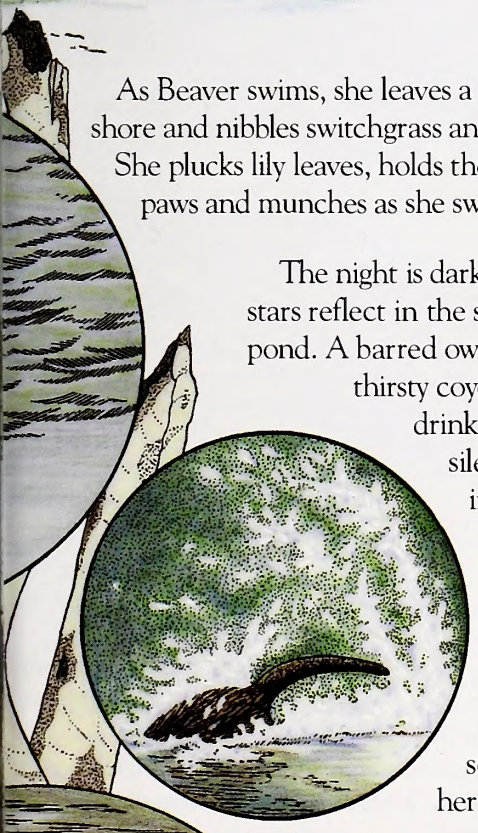
North Carolina beavers build lodges along shorelines as well as in the centers of ponds. The wetlands they create provide habitat for numerous birds, mammals, reptiles, amphibians and fish.

Beaver leaves the lodge swimming rapidly underwater. Her tail helps her steer and her webbed hind feet propel her forward. When she surfaces, she listens and sniffs. She hears the watery noises of the other beavers leaving the lodge, the dull *"ker-thunk"* of bullfrogs and the musical trill of spring peepers. She smells the sweet aroma of sap oozing from a debarked sweet gum tree and the musky scent of a mink hunting along the distant shore.



As Beaver swims, she leaves a V-shaped wake. She snoops near shore and nibbles switchgrass and pondweed. She plucks lily leaves, holds them in her paws and munches as she swims.

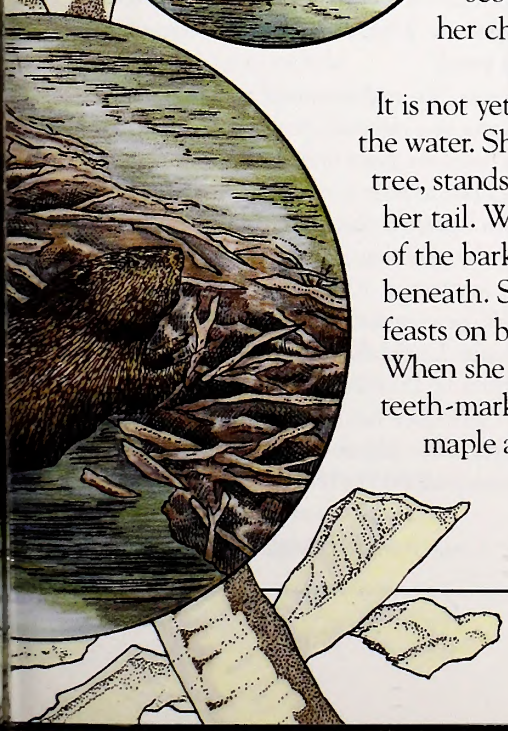
The night is dark and stars reflect in the still pond. A barred owl hoots as a thirsty coyote comes to the water's edge to drink. Suddenly —*"WHAP!"* A loud tail-slap shatters the silence as Father Beaver sounds an alarm. Beaver instantly dives for deep water. Far from shore she surfaces, sniffing and listening. The coyote is gone.



Beaver swims across the pond to the dam. Her parents built it from mud, sticks and branches and she and the rest of her **colony** keep the dam in good repair. Beaver dives to the bottom of the pond, scoops mud and carries it to the surface clutched to her chest. She pats the mud onto the dam.

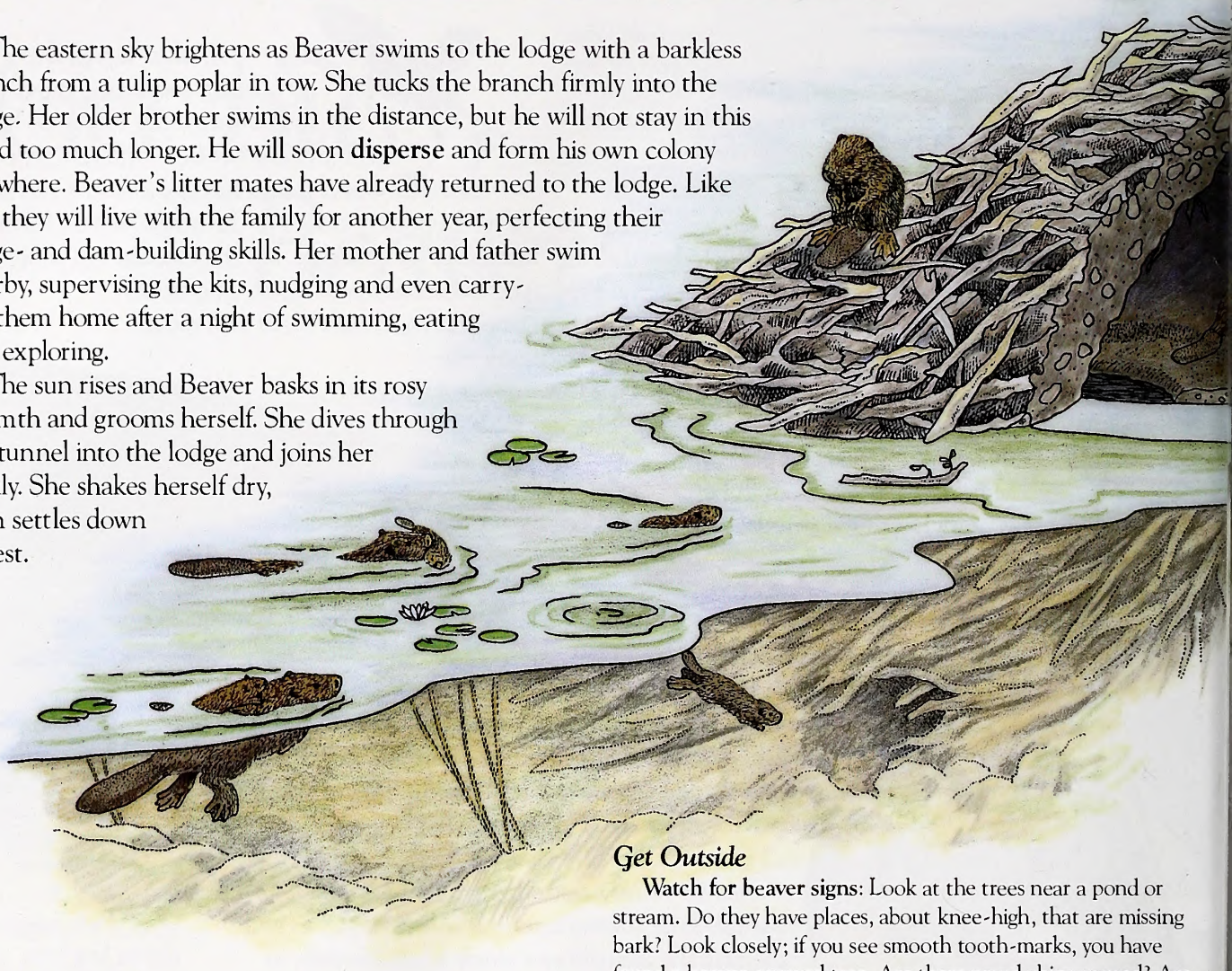
It is not yet dawn as Beaver swims into a small bay and leaves the water. She waddles up the bank to a young sweet gum tree, stands on her hind feet and braces herself with her tail. With her sharp **incisors** she chisels hunks of the bark and the nutritious **cambium** just beneath. She works quickly and efficiently, and feasts on bark and cambium of several trees. When she returns to the water, she has left her teeth-marks on three sweet gums, a young red maple and a sapling dogwood.

Besides eating leaves and the bark and cambium layers of trees, beaver sometimes lick the sap that drips from previous gnawing. When cutting a tree, a beaver repeatedly makes five or six cuts with its incisors, then rips away the resulting chunk of wood. When enough chunks have been removed, the tree falls.



The eastern sky brightens as Beaver swims to the lodge with a barkless branch from a tulip poplar in tow. She tucks the branch firmly into the lodge. Her older brother swims in the distance, but he will not stay in this pond too much longer. He will soon **disperse** and form his own colony elsewhere. Beaver's litter mates have already returned to the lodge. Like her, they will live with the family for another year, perfecting their lodge- and dam-building skills. Her mother and father swim nearby, supervising the kits, nudging and even carrying them home after a night of swimming, eating and exploring.

The sun rises and Beaver basks in its rosy warmth and grooms herself. She dives through the tunnel into the lodge and joins her family. She shakes herself dry, then settles down to rest.



What Does It Mean?

yearling: an animal that has passed its first birthday but has not reached its second

siblings: individuals having the same mother and father

forage: to look for food

oil glands: glands located near a beaver's tail that produce a yellowish-brown, waxy substance. This substance provides scent cues for other beavers and makes the coat water repellent

kits: babies; young born this year

weaned: no longer dependent on mother's milk

colony: a community of related animals that live and work together

incisors: long, sharp front teeth that are used for cutting. In beavers these teeth grow constantly, and are kept a proper length by gnawing

cambium: the growing part of a tree that lies just underneath the bark. On large trees the cambium can be up to ¼-inch thick

disperse: to leave the home birthplace and begin to live independently

Get Outside

Watch for beaver signs: Look at the trees near a pond or stream. Do they have places, about knee-high, that are missing bark? Look closely; if you see smooth tooth-marks, you have found a beaver-gnawed tree. Are there wood chips around? Are the wood chips bright (fresh) or gray looking (old)? Do you see trees that have been partially or totally cut?

Watch for neighbors: What other animals do you see in or around the beaver pond?

Watch for beavers: You might see a beaver swimming if you sit quietly near the water at a place where you have seen fresh cutting. Best viewing times are dawn and dusk. Bring along a good book or your sketchpad to keep you quietly busy while you wait.

Make your own beaver colony: Make a whole family of different sized beavers by photocopying the art puzzle on the next page. Set the copy machine at 100 percent for kits, at 130 percent for yearlings and 150 percent for adults.

Visit the Museum: Learn about life in a beaver pond each Saturday in May from 12:15 - 12:45 p.m. and 1:15 - 1:45 p.m. as museum educators introduce nature's environmental engineers. All programs are free. N.C. Museum of Natural Sciences, Raleigh. For more information, call (919) 733-7450.

Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon.

Read and Find Out

- *Beavers in North Carolina*, by David K. Woodward and R. B. Hazel, N.C. Cooperative Extension Service, Publication Number AG-434, 1991.
- *Busy Beavers* by M. Barbara Brownell, National Geographic Society, 1988.
- *Meet The Beaver* by Leonard Lee Rue III with William Owen, Dodd, Mead & Co., 1986.
- "The Beavers are Back" by Mark Taylor, *Wildlife in North Carolina*, September 1985.
- "A Morning on Beaver Pond" by Lawrence S. Earley, *Wildlife in North Carolina*, October 1982.

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Everybody Needs a Home: teaches students that people and other animals share a basic need to have a home.

My Kingdom for a Shelter: teaches students about materials and techniques used by animals to build their shelters.

Pond Succession: teaches students about natural environments and how such environments can undergo processes of change.

Wetland Metaphors: teaches students the characteristics of wetlands and their importance to wildlife and humans.

Get WILD

Upcoming advanced N.C. WILD workshops for educators include:

June 1-3—*Coastal Aquatic Ecosystems of the Lower Neuse River*. Camp Don Lee, Oriental. Laurieann Phalen. (919) 249-1106.

June 23-24—*Endangered Species*. Pisgah Center for Wildlife Education, Pisgah Forest. Laura Elliot. (704) 877-4423.

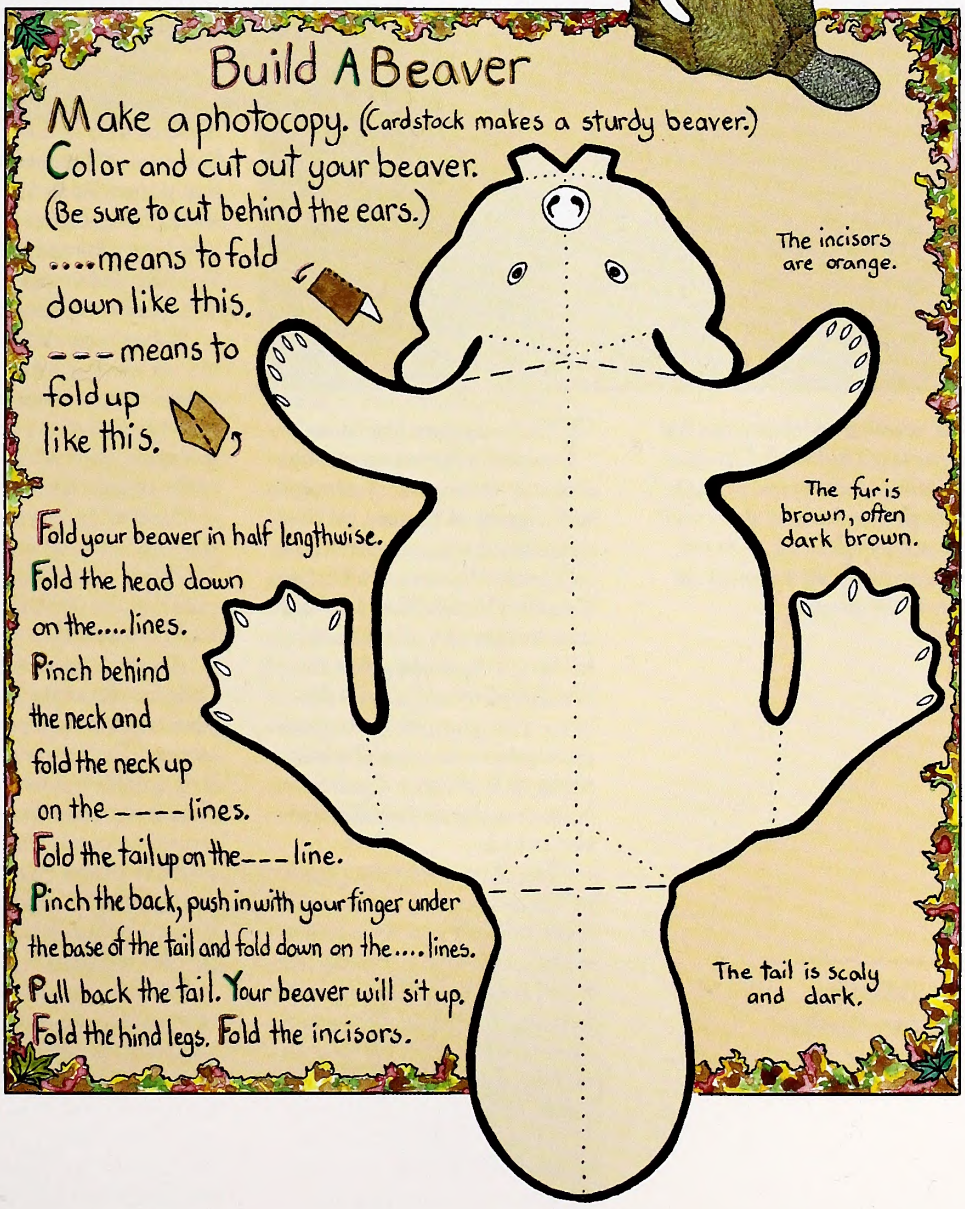
June 29-July 1—*Mountain Stream Ecology*. Pisgah Center for Wildlife Education, Pisgah Forest. Laura Elliott. (704) 877-4423.

To sign up or to learn more details, call the listed contact or check our web page at **http://www.sips.state.nc.us/ Wildlife/ ConservationEd/wild/calendar/**

Build A Beaver

Make a photocopy. (Cardstock makes a sturdy beaver.)
Color and cut out your beaver.
(Be sure to cut behind the ears.)
....means to fold down like this.
---means to fold up like this.

Fold your beaver in half lengthwise.
Fold the head down on the....lines.
Pinch behind the neck and fold the neck up on the ----lines.
Fold the tail up on the---line.
Pinch the back, push in with your finger under the base of the tail and fold down on the....lines.
Pull back the tail. Your beaver will sit up.
Fold the hind legs. Fold the incisors.



Rabies Epidemic Continues to Spread Across North Carolina

KEN TAYLOR

***The number of** rabies cases has skyrocketed in North Carolina, spreading to nearly every county. Though many animal species are affected by rabies, raccoons continue to be the predominant carriers of the disease.*

Edited by Rodney Foushee

The scenes are like those out of a horror movie, but they are all too real. A swimmer and a group of boaters, on two separate occasions, were attacked by rabid beavers at Chatham County's Jordan Lake last summer. In February, a rabid wild fox bit a 7-year-old girl at the North Carolina Zoo in Asheboro. Though none of the people involved contracted rabies, many animals that come in contact with rabid wildlife are not so lucky.

The number of rabies cases in North Carolina has skyrocketed over the past four years, and already 1998 is looking like it will continue the trend. Since January, more than 75 cases of rabies have been confirmed, establishing a pace that will likely break 1997's record 879 cases.

"The work load continues to be setting records for each month relative to the same point in time in past years," said Todd McPherson, head of the virology/serology branch of the state Laboratory of Public Health.

Invaded simultaneously from the north and south by two separate outbreaks of the disease, North Carolina is experiencing a rabies epidemic. In 1993, 71 cases of rabies were confirmed in the state, which has since doubled almost yearly to just under 900 in 1997. Equally alarming is the variety of animals affected. Kittens, rabbits, beavers and even cows have been found rabid. But raccoons continue to be the predominant carriers of the disease because of the ease in which this particular strain is transferred among coon populations, said Perry Sumner, the N.C. Wildlife Resources Commission's furbearer project leader.

Rabies is generally transmitted via saliva entering a scratch or bite wound. Once in the body, the virus will travel to the brain and begin replicating. Symptoms of the disease include a "dumb" or "furious" phase, during which animals can become agressive. The next symptom is death primarily by cardiac arrest, McPherson said.

Another cause of death, especially for raccoons, has resulted from contact with pets or pet owners. The bandit critters have little trouble inhabiting residential areas. And reports of deranged raccoons climbing backyard fences and being killed by dogs or shot by residents have become commonplace in some parts of the state.

Once an animal suspected of having rabies has come into contact with people, animal control officers are required to kill the animal and send its head to the state lab for evaluation. McPherson said the inflow of specimens had approached an overwhelming level until last year, when the N.C. General Assembly appropriated $200,000 to fund two additional technicians and more testing equipment for the lab.

Now, the question is whether North Carolina should direct funds toward preventing the disease. Some states, like Texas, New York and Ohio, have dropped vaccinated biscuits into rabies-concentrated areas, with varying degrees of success. However, Sumner said the oral-vaccination approach will likely not be used in North Carolina for two reasons: lack of natural barriers and a high cost. Widespread vaccinations can only work if the target population is isolated from outside contamination by buffers like mountain ranges or rivers. And even with barriers, vaccine drops must be continually performed, which can cost millions of dollars.

Instead, Sumner believes the disease will level off naturally to lesser frequencies, but without disappearing completely. "What it will probably do—and this is based on what rabies has done in other Southeastern states—is the disease will hit a high density population of raccoons pretty hard and that will slow the spread down when many of them die," he said.

Families can protect themselves from the disease by maintaining their pets' current vaccinations, avoiding wild animals and reporting any animals behaving strangely to local animal control officers.

—Chris Powell

NORTH CAROLINA Wildlife RESOURCES COMMISSION

Federation Honors Wildlife Officer of the Year and Jim Dean

Paul Linder of Deep Run, a master officer with the enforcement division of the N.C. Wildlife Resources Commission, has been named wildlife officer of the year by the N.C. Wildlife Federation.

Linder, who serves in Wildlife District 2, received the Wildlife Federation honor during the Governor's Awards banquet which closed the 53rd annual convention of the conservation organization at Research Triangle Park.

A 21-year veteran with the Wildlife Commission, Linder began his career as a wildlife enforcement officer in Gates County. He was promoted to master officer in 1981 and transferred to Lenoir County, where he is currently assigned with the additional duties as a canine officer. His present patrol area in District 2 includes Lenoir, Jones, Onslow and Duplin counties. Linder was also named wildlife officer of the year by the N.C. Wildlife Federation in 1983.

Also honored by the Wildlife Federation as officers of the year for their respective wildlife districts were: 1 - Mark Rich, Edenton; 3 - James Ward, Roanoke Rapids; 4 - Kent Barefoot, Wade; 5 -Todd Kennedy, Liberty; 6 - Scott Isley, Cleveland; 7 - Dennis Mehl, Hiddenite; 8 - Michael Hatley, Valdese; 9 - Vance Gibson, Tuckasagee.

In a moving ceremony, former

STEVE WILSON

Former Wildlife in North Carolina *editor Jim Dean (left) and Master Officer Paul Linder (center) were honored by the N.C. Wildlife Federation for their commitment to wildlife conservation. Linder was selected as the state wildlife officer of the year, and Dean was inducted into the federation's N.C. Conservation Hall of Fame. Wildlife Enforcement Col. Roger LeQuire was also on hand for the awards ceremony.*

Wildlife in North Carolina editor Jim Dean was inducted into the federation's North Carolina Conservation Hall of Fame for his commitment to the state's sporting heritage and conservation efforts that spans decades.

Dean retired from the Wildlife Commission in the fall after working on the magazine for 28 years including serving as its editor for more than 18 years. During his tenure as editor, Dean was instrumental in changing the design and editorial content of the award-winning magazine and making it an influential force in conservation journalism in the state. Jim is best known for his "Our Natural Heritage" column that appears at the beginning of each month's magazine. His blend of down-home humor and past outdoor experiences has drawn a legion of loyal readers since he began writing the column in 1978.

Dean continues to write his column and occasional feature articles for the magazine.

Boating Safety

Drowning is the leading cause of death involving recreational boating, but by simply wearing a life jacket you can dramtically increase your chances for survival and rescue.

The theme of this year's National Safe Boating Campaign is "Boat Smart from the Start. Wear Your Life Jacket." The campaign will kick off with National Safe Boating Week—May 16-22.

During this week, members of the National Safe Boating Council, including the Coast Guard Auxiliary, U.S. Power Squadrons, Army Corps of Engineers and the American Red Cross as well as state law enforcement agencies including the N.C. Wildlife Resources Commission will provide special programs on safe boating.

Got a Gobbler?

Call 1-800-I-GOT-ONE to report your turkey harvest.

**All bearded birds harvested during the April 11-May 9 turkey season must be reported via the toll-free telephone reporting system.*

Wildlife in North Carolina Readers Question Mason Farm Development

Dear Wildlife,

I was dismayed by the statements in the "Piedmont Patriarch" article (January 1998) that indicated the 800-acre Mason Farm was left to the University of North Carolina by the Mason family with the stipulation that the land never be divided or sold by the university.

John Terres wrote in *From Laurel Hill to Siler's Bog* in 1969 that Mason Farm was 600 acres. Apparently 200 acres went early on—in the late 1940s according to your article—for a golf course. Now the acreage is a mere 367 acres with "expensive homesites" going up on Laurel Hill.

What despicable behavior by the University of North Carolina, and what a betrayal of trust of the agreement with the Masons. I hope the remaining land in this nature reserve will be left intact and undisturbed for future generations.

—*Nada C. Carroll*
Old Fort, N.C.

Editor's Note: This is one of several letters received from readers questioning the University of North Carolina's handling of Mason Farm. Below is a response from Peter White, director of the N.C. Botanical Garden which manages the Mason Farm Biological Reserve for the university.

LAWRENCE S. EARLEY

***The N.C. Botanical** Garden manages the Mason Farm Biological Reserve near Chapel Hill including the upkeep of the Mason family burying plot.*

While I applaud the sentiments expressed by the writers and their passionate defense of natural areas, I will point out that the lands described—the original 800-acre Mason Farm, the 367-acre biological reserve and the 600-acre Mason Farm described by Terres—are overlapping, but not identical tracts. As I will show, the University of North Carolina has not violated the stipulation of the gift of the original Mason Farm. The Mason Farm Biological Reserve and its natural areas are indeed priceless treasures that should be protected for future generations.

Mary Elizabeth Morgan Mason's will attached only three requirements for the bequest of the 800 acres to the university: 1) monuments were to be commissioned and the family cemetery was to be maintained from a $1,000 gift; 2) portraits of the Mason's daughters and Rev. Mason were to painted and placed in appropriate university halls; 3) the land was not to be alienated entirely (the land was not to pass out of university ownership.)

Although the Mason daughters enjoyed hiking the woods and fields of Mason Farm for wildflowers, there is nothing in the will that restricts use of the land other than it can not pass from university ownership. The Masons themselves expanded the farm fields, and it is worth noting that there may actually be more acres in pine and hardwood forest now than at the time of peak agricultural production in the 1800s. Though the Masons could not have anticipated the diverse uses the university has made of the farm, it must be remembered that they made their livings clearing the land, tilling the soil, cutting trees and allowing livestock to range the remaining woodlots. In any case, the university still owns all 800 acres of this tract and has not violated the requirements of the will.

Although Terres describes 600 acres in his wonderful book, the tract he refers to only partially overlaps the 800-acre Mason Farm. And the land on Laurel Hill that was recently developed never belonged to the university. As a final complication, the current Mason Farm Biological Reserve includes just 167 acres of the original Mason Farm gift—the remaining 200 acres were set aside by the university trustees from other lands owned by the university.

Hunters for Hungry Set Another Record in 1997

MELISSA McGAW

***North Carolina** deer hunters donated a record number of deer to help feed the hungry last year. Hunters donated more than 40,000 pounds of deer meat to the N.C. Hunters for the Hungry program in 1997 —up from 33,000 pounds the previous year. Gov. Jim Hunt (left) helps recently retired Wildlife Commission Management Chief Hal Atkinson serve venison to the needy at the Shepherd's Table soup kitchen in Raleigh.*

N.C. State Museum of Natural Sciences Acquires Whale Skeleton

A 30-foot-long humpback whale skeleton is the newest addition to the N.C. State Museum of Natural Sciences' marine mammal collection thanks to a partnership with the University of North Carolina at Wilmington. The young male whale, found in Beaufort Inlet, died after a collision with a boat.

"It's unique for us. We did not have a humpback in our collection," said Mary Kay Clark, the museum's mammals curator. The new humpback whale skeleton will replace the finback whale that exhibitors had intended to move to the coastal North Carolina exhibit in the new Museum of Natural Sciences. Close examination revealed that the 67-year-old finback's bones had become very brittle. "The new skeleton is in very good condition and will make a better display as well as save time and money that we'd have had to put into the repair of the finback," Clark said.

The museum's mammal staff began cleaning the bones by burying them in horse manure. With help from colleagues at N.C. State University's School of Veterinary Medicine, they X-rayed the small bones of the flippers to help put them back together.

The acquisition was the first in a series of marine mammals the museum will obtain through their association with Bill McLellan, coordinator of the N.C. Marine Mammal Stranding Network and a researcher in the Vertebrate Anatomy and Biomechanics Lab at the University of North Carolina at Wilmington. McLellan and other researchers in the network collect data and tissues from stranded marine mammals for research, then the museum collects the bones. The museum has also acquired four dolphins through the network.

Last year, a record 200 marine mammals were stranded on North Carolina's shoreline. With one of the highest stranding rates in the United States, and more humpback strandings than any other state, future acquisitions of this endangered whale and other marine mammals are possible. Because the biology of marine mammals is poorly known, "anytime we can collect them and get information on them, it's extremely valuable," McLellan said.

MELISSA McGAW

***Museum of Natural Sciences'** staff members John Kelly (left) and Ed Hajnos uncover the skull of a 30-foot-long humpback whale. The skeleton, which will be displayed at the Raleigh museum, was buried in manure for several months to allow soil insects and microbes to clean the bones.*

—Information courtesy of the N.C. State Museum of Natural Sciences

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

May 9

International Migratory Bird Day celebrations will be held at parks and wildlife refuges across the state. Check with your local park for more information.

May 16-22

National Safe Boating Week will be observed during the week immediately preceding Memorial Day.

May 16

A Youth Hunter Conservation Education Field Day will be held at Mill Ridge Fields in Hot Springs. The event, sponsored by the Wildlife Commission, the U.S. Forest Service and many private hunting organizations, will provide activities for youths ages 9 to 15 to learn the legacy of safe and ethical hunting and forest management.

The free event, which is open to the first 125 registered youths, will feature turkey calling seminars, wildlife and forestry management activities, an upland game bird dog demonstration and shooting ranges. All young people must be accompanied by a chaperone. To register or for more information, call (704) 622-3203.

May 23

The ninth annual Great Smoky Mountain Trout Festival will be held at the Waynesville Recreation Park in Waynesville. Events will include a traditional wooden trout race, live entertainment, hiking and fishing equipment displays, flycasting demonstrations, education displays and food and drinks. For more information, call (704) 456-3575.

May 30

The N.C. Bluebird Society will hold its annual meeting at the Southeastern Baptist Theological Seminary Cafeteria in Wake Forest from 10 a.m. to 2:30 p.m. Connie Toops, author of *Bluebirds Forever*, will be the guest speaker. For more information, contact Chuck Bliss at (910) 625-5423.

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through February 1998

Principal Balance
$24,910,730.25

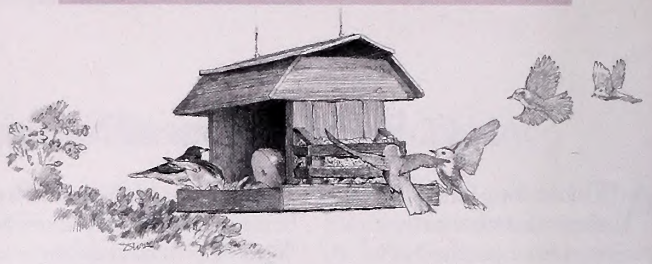
Interest Earned
$25,309,404.98

Total Receipts
$50,220,135.23

Interest Used
$12,329,807.04

Fund Balance
$37,890,328.19

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



Attracting Migrants

by Rodney Foushee

With International Migratory Bird Day being celebrated this month, it is only fitting to roll out the welcome mats as these feathered friends return to North Carolina. Here are some tips to spruce up your property and create habitat that will invite more migratory songbirds to your backyard.

Varied Victuals: Though many resident songbirds including cardinals and finches are perfectly content with the standard fare of millet and sunflower seeds offered at most backyard feeders, many migratory bird species have more varied dietary needs. By adding a few extra foods to the selection, you can attract colorful migrants that would normally bypass your yard.

The addition of high-energy suet cakes is a great way to draw warblers to your property after a long flight from the tropics, while fruit feeders loaded with chopped bananas, apples and raisins will attract migrating orioles and tanagers. Resident mockingbirds, robins and bluebirds will also enjoy this fruit offering.

No migratory food shopping list would be complete without the addition of one or more hummingbird feeders loaded with prepared sugar water. Feeders should be hung without delay as most hummingbirds arrive early this month.

Though feeders will provide hummers with an early dose of energy, you can go one step further to help these winged wonders by planting showy, nectar-producing flowering shrubs and vines in your backyard. Good choices include trumpet creeper, columbine, rose mallow, beebalm, morning glory and native honeysuckles.

Water, Water: Like all wildlife, migratory songbirds require water to survive. Though the standard birdbath helps, the addition of running water will do wonders to attract all types of birds to your backyard. Elaborate water gardens and fountains are fine if you can afford them, but the simple drip of a spigot or garden hose into a shallow container will also make a difference.

Cover Me: A long-term solution to attracting both migratory and resident songbirds to your property is to plant fruiting trees and shrubs of various heights to provide natural food and layers of cover. Cherries, crabapples, dogwoods, elderberries, native hollies,hawthorns and mulberries are all fine choices for food, while evergreen trees and hedges will provide excellent cover. By providing a varied habitat, you can maximize your backyard for migratory songbirds as well as plenty of other wildlife.

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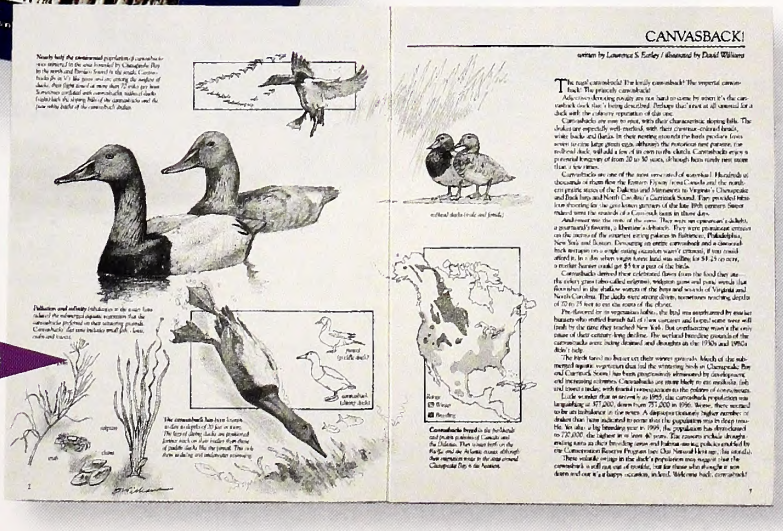

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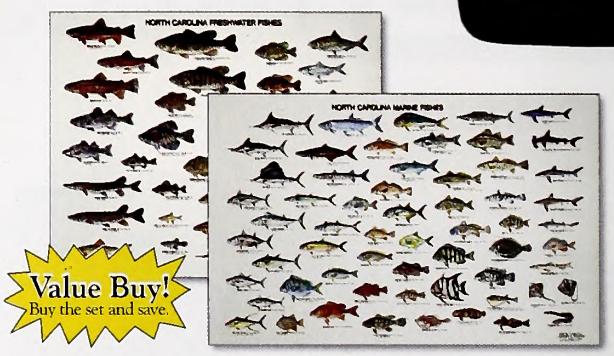

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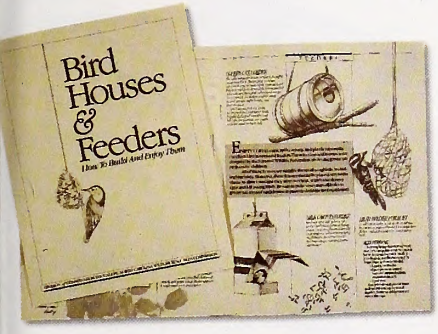

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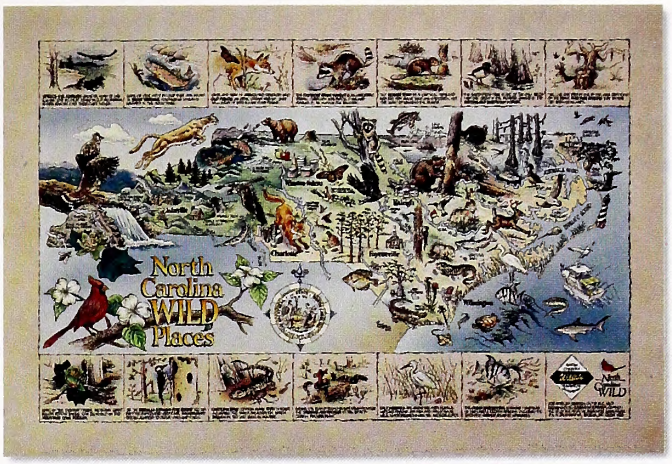

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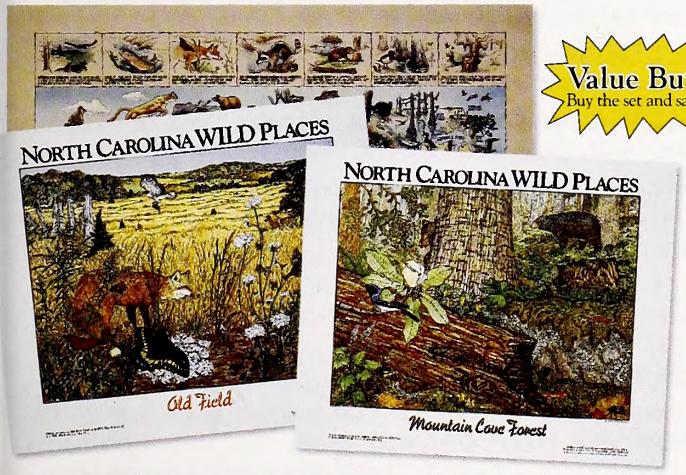

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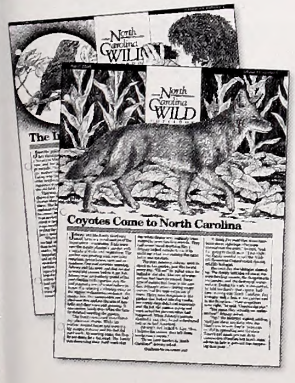

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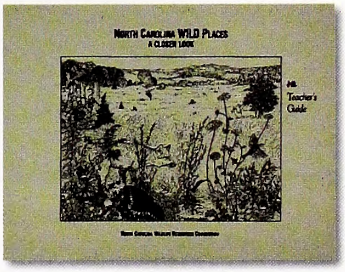

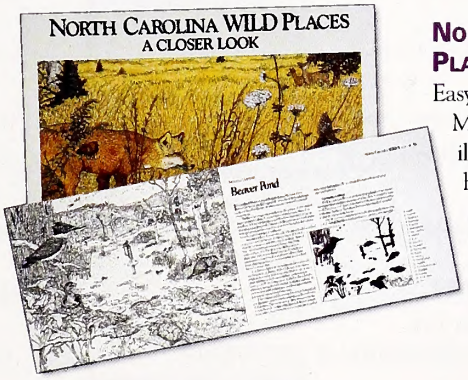

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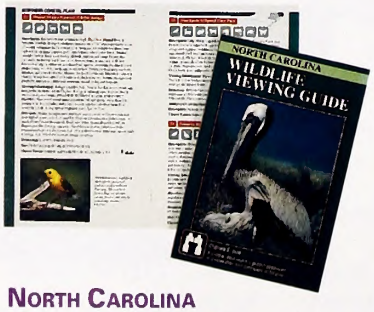

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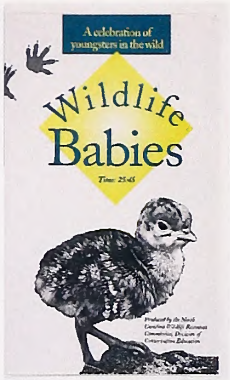

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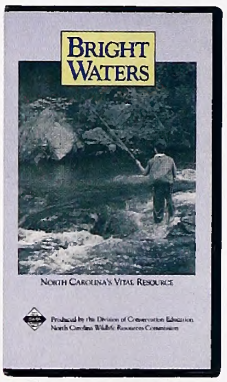

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Wildlife Commission **Spotlight**

Keeping It Safe

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A Growing Concern. Among their many duties, N.C. Wildlife Resources Commission enforcement officers also promote boating and water safety—a task that continues to grow yearly. The number of recreational boats in the United States has quadrupled from less than six million in the early 1960s to more than 25 million today. In North Carolina, 328,594 boats were registered during 1997. That same year there were 222 boating accidents statewide resulting in 21 fatalities.

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WILDLIFE IN NORTH CAROLINA

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Fishing's Top Thrill

by Jim Dean ©1998

I caught a few fish last year in spite of myself, and the ones that I remember best were connected—so to speak—by a common thread. There was a respectable largemouth bass that sucked in a deer-hair bug so gently that I wasn't even sure I'd had a strike until I set the hook and felt that surge of power. Another bass—it had to be big, but I never saw it—struck a muskie Jitterbug on a dark night just as I was about to lift the lure out of the water. That thunderous strike had all the finesse of a bowling ball dropped at my feet, and it scared the boogers out of me.

ILLUSTRATED BY JACKIE PITTMAN ©1998

There was also a brown trout that rose ever so deliberately beside a sloping rock shelf and drifted barely inches beneath my cut-wing beetle for what seemed an eternity before it finally tipped up and ate it. Then, there were also all those long, balmy spring and summer afternoons when fat bluegills slurped my white cork popper. I could go on, but perhaps you have already figured out that all of these fish were caught on lures or flies that float.

What is so special about this business of catching fish that feed on the surface of the water? My guess is that the thrill is mostly visual, the delicious concentration of watching the lure or fly, then seeing its progress suddenly interrupted right before your eyes, often violently. Some fishermen also consider it more challenging to catch fish on top, but that's mostly self-deception since it's actually fairly easy when conditions are right.

This near obsession is a bit strange considering that most game fish never feed on the surface. Others do so only on rare occasions, and even those that more or less regularly partake of floating food eat far more of their meals in the depths. Indeed, freshwater trout are among the few species truly adapted to surface feeding, and they are programmed to look for floating terrestrial insects and especially mayflies or other aquatic insects that hatch seasonally on the surface film. Bass and bluegills eat surface meals, but they don't have to in order to survive. That's even truer of salmon, bluefish, stripers and countless other freshwater and saltwater species that can occasionally be caught on top.

"What is so special about this business of catching fish that feed on the surface of the water?"

Our preoccupation with top-water fishing is historic. At the turn of the century, James Heddon's first hand-carved wooden bass lure was a floater, and the flies the bronze-age Macedonians used for "speckled fish"—probably trout—may very well have been fished on the surface. Indeed, many of our favorite surface lures and flies have changed little over the years.

From the beginning, the two most common types of top-water bass lures have been plunkers—cup- or flat-faced lures designed to push water and make a chugging noise—or lures rigged with propellers that turn and kick up a fuss. Modern variations are little changed from the originals. Among bass bugs, you can easily catch just as many bass on the kinds of cork poppers and deer-hair bugs that appeared about 1905 as you can on their latest counterparts. And while the development of highly buoyant fly-tying materials—particularly closed-cell foam—has generated a lot of new floating flies, the old hackled patterns pioneered by Theodore Gordon still dominate the genre.

For top-water enthusiasts, arguably the most innovative gains have been made in bass lures and the tactics used to fish them. If you aren't already familiar with them, check out those new soft plastic jerk worms, salamanders and similar lures designed to float. Rigged weedless, they are very nearly the only lures that will work in thick lilies and other dense cover. Furthermore, they can be rigged with heavier hooks and fished either on the surface or allowed to sink slowly and enticingly into likely pockets. These soft top-water lures are terrific, and they have virtually revolutionized the way many skilled anglers fish for bass.

Another lure you shouldn't ignore is the modern buzzbait, a versatile adaptation of bass fishing's oldest artificial. These lures with their big, noisy props often wake up bass that won't strike any other surface lure.

Be aware that tactics have also changed. Our grandfathers almost always fished surface lures very slowly, and though that tactic still works at times, modern anglers are using plunkers and prop baits in open water on big lakes, popping them along at a rapid clip to imitate feeding or spooked shad.

Just keep in mind that a preference for top-water fishing is not a moral issue. We aren't better, or worse, because we prefer dry flies to nymphs—or worms, corn or marshmallows, for that matter. Indeed, the only problem with using marshmallows is that some of us have a tendency to eat the bait.

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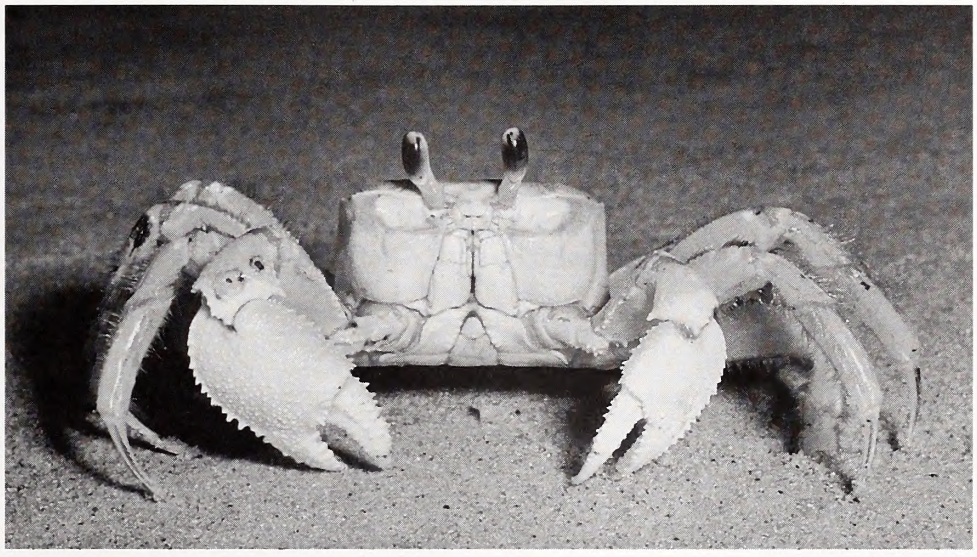

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Contents

WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

June 1998 *Volume 62, Number 6*

Features

4 **Living with Bears** *written by Calvin H. Allen* ©1998
photographed by William S. Lea ©1998
More and more of North Carolina is black bear country now, and run-ins between people and bears are inevitable. Here's how to lessen the impact.

8 **Smart Moves for Bass** *written and photographed by Soc Clay* ©1998
When to hold and when to fold? It's the bass angler's classic dilemma as well as the poker player's. Successful fishermen find that making their moves early pays off.

12 **A Confusion of Woodpeckers** *written by Elizabeth Hunter* ©1998
illustrated by Kimberly K.C. Schott
They seemed a lot like normal teenagers—you know, spiked hair, loud talk, unable to do a thing for themselves. But sometimes, the young downy and hairy woodpeckers looked almost Zenlike.

14 **Seasons of the Magnolia** *photographed by Melissa McGaw*
With a heavy, cream-colored blossom that emits a fragrance you can drown in, the Southern magnolia is the classic tree of the South. But have you followed it through all its seasons?

18 **Sanctuary** *written by Phillip Manning* ©1998
photographed by Walker Golder ©1998
Between Cape Fear and Cape Hatteras, 19 mostly man-made islands are squawking with recovering populations of pelicans, gulls, ibises, herons and other water birds.

24 **Discovering Crayfish** *written and photographed by Harry Ellis* ©1998
Are these tiny crustaceans merely throwbacks to a primitive age? Not for a young boy with a hand-cut alder fishing pole.

page 8

page 18

page 14

Departments

page 28

Our Natural Heritage *by Jim Dean* ©1998 ..... **inside cover**
Nature's Ways *by Lawrence S. Earley* 2
N.C. WILD Notebook *by Consie Powell* ©1998 28
Back Porch *by Rodney Foushee* 32
Wildlife Through the Year *by Rodney Foushee* 36

Cover *This winsome black bear is hardly concerned about the bee swarm he's stirred up. Photograph by William S. Lea.* ©1998

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Declaration of Interdependence

written by Lawrence S. Earley
illustrated by David Williams

In natural ecosystems, a document like the "Declaration of Independence" wouldn't really make too much sense. Dependency in nature is not a fault of bad breeding or bad luck; it's a condition of life.

There are so many examples of the interdependence of living things that it is hard to single out one, yet the case of freshwater mussels is quite instructive. Part of a large order (Unionoida) of mollusks that once carpeted the rivers of the Southeast, freshwater mussels have evolved a very complex life history that shows the lengths that many species go to hitch a ride.

Freshwater mussels are filter feeders, spending most of their time on a stream bottom straining algae, diatoms and other edibles from the water column and, in the process, cleaning the water. Each freshwater bivalve filters about four quarts of water per day across its gills, and in the days of their abundance they must have played a huge role in maintaining clean rivers.

These freshwater bivalves have a peculiar kind of a dependency: In their larval stage, they must attach themselves to a fish. Smaller than pinheads, the "glochidia," as the larvae are called, affix themselves to the gills of a host fish—often a specific species—and remain there for a few weeks. Generally, the mussels don't hurt the fish, unless they cling to it in such enormous numbers that they interfere with its respiration.

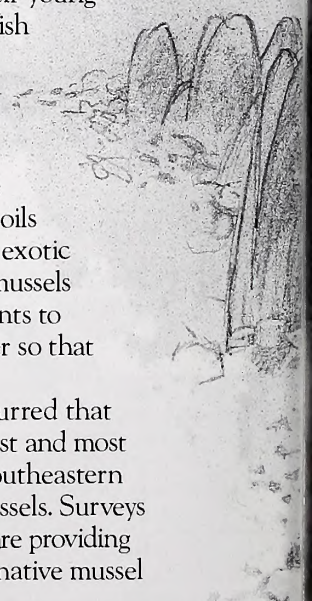
Some glochidia are released by the female directly into the water when a host fish comes near. Others are housed in gelatinous packages that look like flat worms, insect larvae or larval fish. Still others move like a wounded minnow, complete with a long tail. One bite from a hungry fish and the larvae spew out of the package, into the fish's mouth and onto the fish's gills. The glochidia stay on board up to a few weeks, when they metamorphose into juveniles, fall off and begin their independent life on the stream bottom.

Though strange, this trait makes sense when you realize that freshwater mussels originated in the sea and colonized freshwater habitats later. To cope with sometimes swift river currents, they needed a mechanism that ensured their young didn't just float out to the estuary, but stayed put. Attaching to a host fish enabled their young to colonize new areas with the movements of the host fish.

An independent baby mussel has no future. If a glochidum doesn't attach itself to its host fish, it dies. And in many rivers and streams of North Carolina and the Southeast, that's happening more and more. Young bivalves are killed directly by sediments from eroded soils that clog their filter mechanisms and suffocate them; by pollution; by exotic mussels like the zebra mussel that compete with native species. Other mussels are eliminated indirectly. For example, dam construction causes sediments to accumulate, and dams also change the freshwater environment of a river so that host fish often find it impossible to live in the new conditions.

As a result, a wave of mollusk extinctions in the Southeast has occurred that has gone virtually unnoticed until recently. Called "the country's richest and most imperiled center of aquatic diversity" by The Nature Conservancy, southeastern rivers and streams are yielding fewer and fewer species of freshwater mussels. Surveys here by wildlife biologists with the N.C. Wildlife Resources Commission are providing evidence of this disturbing trend. In North America, 12 percent of the native mussel species have become extinct; only 23 percent are considered stable.

The dependency of freshwater mussels on a host fish is unalterable, the result of millions of years of natural selection. The link between clean rivers and freshwater mussels may be just as strong. Indeed, our dependency on these mussels may be far greater than we ever knew.

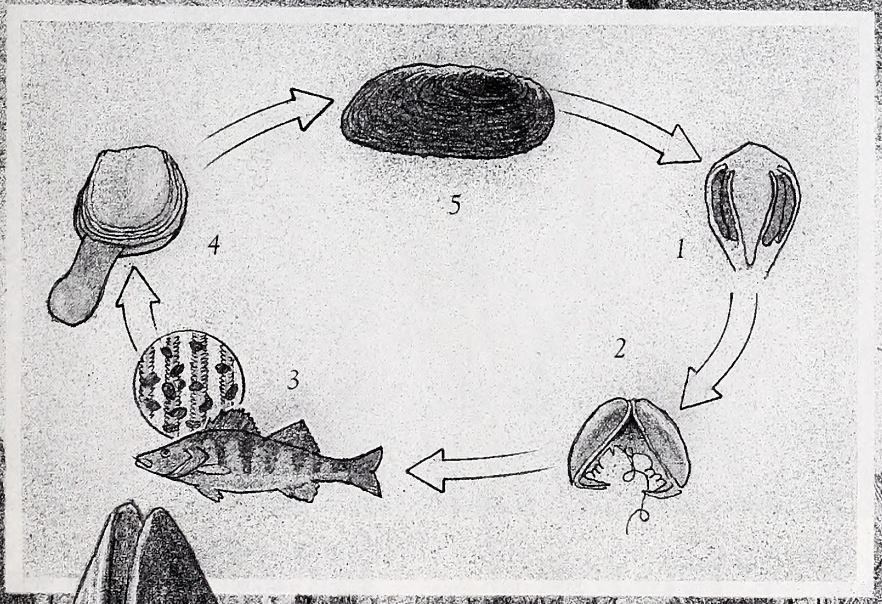


Other Reading

- ★ Arthur E. Bogan, "Freshwater Bivalve Extinctions . . . a Search for Causes," *American Zoologist* (33: 599-609, 1993).
- ★ William Stolzenburg,"The Mussels' Message," *Nature Conservancy* magazine (November/December 1992).

Surfing the Web

- ★ For good surveys of the biology of freshwater mussels, see the web site organized by G. Thomas Watters of the Ohio Biological Survey. *Address:* http://coa.acnatsci.org/conchnet/uniobio.html
- ★ Two other sites organized by Dr. Watters are also informative. *Addresses:* http://coa.acnatsci.org/conchnet/acfwmus1.html http://coa.acnatsci.org/conchnet/acfwmus2.html
- ★ See the web site of the Florida Museum of Natural History: "A Field Guide to the Freshwater Snails of Florida." *Address:* http://www.flmnh.ufl.edu/natsci/malacology/fl-snail/snails1.html



The life cycle of a freshwater mussel begins when *a female mussel (1) emits a cloud of larval mussels called "glochidia" (2). To complete their development, these young mussels must attach themselves to a host fish (3)—more specifically, to the fish's gills. After several weeks of this parasitic stage, the glochidia fall to the creek bottom as juvenile mussels (4), develop into mature mussels in six to eight years (5) and the cycle begins all over again.*

LIVING WITH BEARS

More and more of North Carolina is black bear country now, and run-ins between people and bears are inevitable. Here's how to lessen the impact.

written by Calvin H. Allen ©1998 / photographed by William S. Lea ©1998

In western North Carolina, folks are still talking about the "Bear Invasion of 1997." Last fall, a poor acorn crop forced black bears to forage in human settlements. Because the black bear population has been rising steadily for the past decade, record numbers of bears emerged from the woods. When bears appeared in backyards and on highways, many people were not prepared. Bears raided yards, garages, barns and storage buildings where they found garbage, bird feeders, grills, pet food, plant bulbs and other edibles.

One man saw a bear in his backyard, grabbed his shotgun, and killed the animal on the spot. When wildlife officials cited the man for killing a bear out of season, people wrote letters to the local papers defending his actions. "If a bear comes into my yard, I'm going to do the same thing he did," one writer steamed.

***Panhandling black bears** are a common sight in some locations. Encounters like this will likely become more frequent as human development continues to encroach on bear habitat. Usually non-threatening, black bears can become dangerous if cornered.*

That fall, numerous bears were treed in cities by pets or humans, where they drew curious onlookers, photographers and law enforcement officers. Wildlife biologists were flooded with calls from landowners, some demanding the bears be removed. "People kept saying, 'Bears aren't supposed to be here, are they?'" says Gordon Warburton, black bear project leader for the N.C. Wildlife Resources Commission.

The answer is, yes, black bears are supposed to be here—hopefully to stay. But with bear and human populations rising steadily, bears can live in North Carolina only if humans learn to tolerate them.

Living with black bears has not been a major problem in North Carolina until recent years. Unregulated hunting and habitat destruction at the turn of the century led to their near extirpation and what was left of them was confined mostly to wild, sparsely populated areas of the mountains and along the coast. Since the turn of the century, however, good wildlife management programs and expanding habitat have enabled bears to make a dramatic comeback. Now an estimated 9,000 bears live in 55 counties in both eastern and western North Carolina.

The bears' success has coincided with a human population boom. The 5 million North Carolinians in 1970 have increased to more than 7 million today, and each year more people seek to live or visit North Carolina's black bear country. Indeed, the state's black bears today are within a day's drive of half the population of the United States.

When booming bear and human populations collide, bears are often the losers. Biologists call that collision the "cultural carrying capacity," meaning that the bear population can grow only in areas where humans learn to live with bears. "Local people are used to bears," says former Wildlife Commission wildlife biologist Bobby Maddrey. "But most people moving into the new residential developments in bear country are uninformed about living with bears."

In bear country, people are apt to encounter bears for a variety of reasons. For example, June through August is breeding season. Males wander long distances pursuing mates, and young males avoid older males. These wandering bears do not remain in settled areas unless people allow them to eat human food.

MAKING ROOM FOR BEARS

Biologists recommend taking specific measures to head off potential bear problems. If bears are already plaguing you, the following suggestions from wildlife biologists may minimize the damage.

Rural Settings

When crops ripen in late summer and early fall, farmers can become bears' best friends. Beehives and trout food are bear favorites in western counties. Here's how to encourage bears to stay in the woods and leave your crops alone.

Beehives

If bears have not yet damaged hives:

- Don't place hives in abandoned or wooded, overgrown areas.
- Don't try to control bears by putting out food in other areas of your property; this just attracts and habituates bears.
- Early in spring, before bears are active, surround hives with an electric fence. Use either temporary fencing (electric net or polypropylene electric tape) or permanent electrified wire with low impedance and high voltage (5,000 volts). Put up warning signs or take other steps to keep people—especially children—away from the fence. String barbed wire and lay sheet metal on the ground around the fence.

If bears have damaged hives:

- Erect a permanent electric fence. You may want to try baiting it with sardines, peanut butter or other food on the top and bottom strands. Again, do not use electric fencing where children may come into contact with it.
- Tie bear hounds up near the hives. Put the hives on a platform surrounded by electric fencing.

Livestock, fish farms

If bears have not yet harmed livestock:

- Store feed in sturdy buildings with secure doors.
- Avoid pasturing animals in remote or heavily wooded areas.
- Quickly dispose of carcasses of dead animals and fish in accordance with regulations.
- Don't try to control bears by putting out food in other areas of your property; this just attracts and habituates bears.
- Pen animals near or in a barn at night, especially expectant females.
- Promptly clear areas of all signs of birthing.

If bears have harmed livestock:

- Erect electric fencing, with the appropriate cautionary measures to protect children.
- Use trained bear dogs or guard dogs.

Other options for the landowner:

If bears continue to destroy crops or other property, you may be able to lease your land to bear hunters to recover some of your losses and to help keep the bear population at a reasonable level. North Carolina law allows landowners to kill bears in the act of destroying or damaging the landowners' property. The bear must be in the act of destroying property, and the kill must be reported to a local wildlife enforcement officer within 24 hours.

Camps

Nothing ruins a good night's sleep like having a hungry bear rummaging through your supplies. Here's how to discourage bears from visiting your campsite for a midnight snack.

Grills

- Clean your campsite after each meal, and scrub grills thoroughly after use.
- Dispose of aluminum foil and scraps in metal containers with locking lids.
- Don't cook or store food in or near your tent. Keep your campsite clean!

Supplies

- At night, store foodstuffs, eating utensils, scented supplies (toothpaste, shampoo) up high away from bears. Bears can break into car trunks.

Garbage and scraps

- Remove all garbage from your campsite at least once a day, and definitely right after each evening meal.
- Take garbage to a main garbage container, if available.
- Carry out everything you carry in, unless you can dispose of it in a bear-proof container.
- Don't toss or bury cooking grease or other food scraps; pack them out.
- Don't overload garbage containers, and don't store food or garbage in tents.

If a bear comes into camp:

- Scare the bear away by banging on pots or yelling. Get several people to make noise and help you.

Urban Settings

Positioned on the edge of the Mount Mitchell Bear Sanctuary, the small town of Montreat attracts many bears some years, says N.C. Wildlife Resources Commission biologist Joffrey Brooks. "The bears will grab a few bags of garbage and carry them into the woods to tear open and have a picnic," says Brooks. "It can turn a nice spot in the woods into a garbage dump in just a few minutes."

Here's how you can help put trash (and bears) in their proper places.

Municipal landfills

- Cover garbage completely by the end of each day. Fence and secure landfills.
- Trim trees near fences.
- Keep the bears out!

Garbage containers

- Cover garbage containers with heavy metal lids that can be locked. Empty containers often enough to prevent overflow.
- Fence the area if possible, using an overhang that projects outward.
- Keep nearby trees trimmed.
- Areas with tourists or other visitors should provide bear-proof containers and instructions for guests who must put out garbage long before pickup.

Garbage services

- Provide customers with instructions on bearproofing their garbage cans. Give them a pickup schedule, and ask them not to leave out garbage until pickup day. Do not let garbage sit out overnight!

Bears in town

- Try to keep people calm. A bear in town is not necessarily a problem, as long as the bear has a clear escape route to woods or other cover, and is not feeding on human food. The bear may be dispersing to new habitat and only passing through.
- Keep people and animals away. Do not corner, surround or approach the bear.

Treed bear

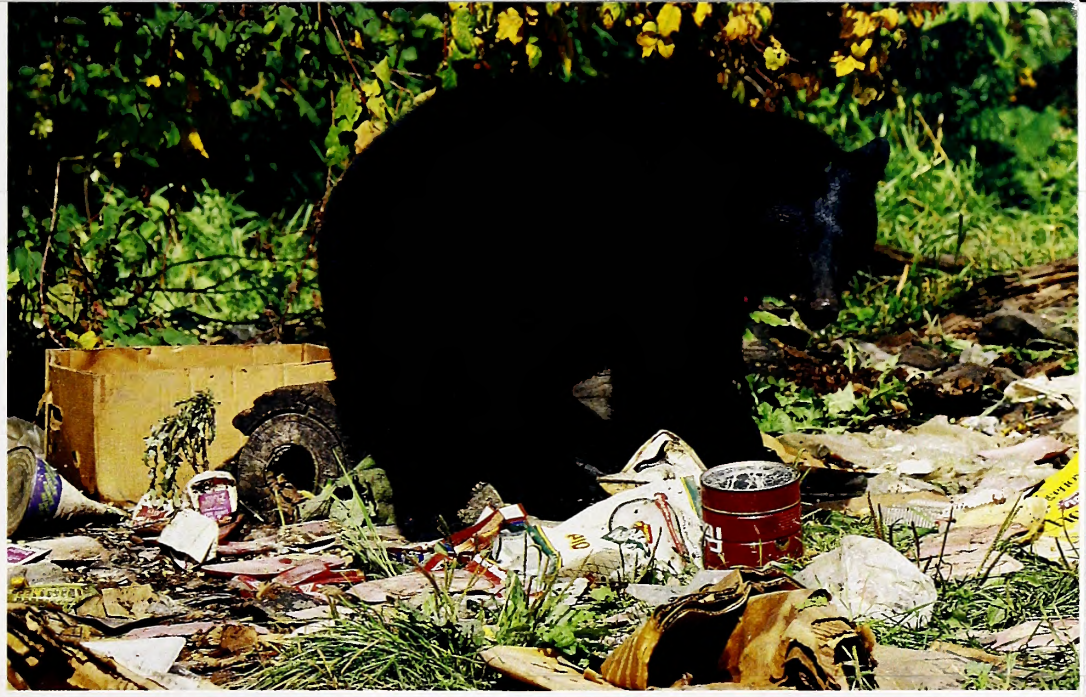
- Move people far away and wait until night falls. Make sure the bear has a clear escape route to woods or other cover.

Injured bear

- Keep people and animals well away from the bear. Do not attempt to move the bear.

RICKEY SMITH

***Some think that** black bears are confined to mountainous areas, but bears also have a long history of coastal living. This picture was taken on Topsail Beach during the 1995 summer. Wonder where all the tourists went?*



***Bears emerge from** winter hibernation with enormous appetites. They will satisfy their hunger at the nearest food source, whether it's a trashcan or a bird feeder. Never feed bears. It only encourages them to frequent your area, increasing the chances of injury to people or pets.*

During late summer and early fall, bears feed almost constantly to fatten for the winter. Bears traveling in groups in the fall are usually females with cubs. The bears prefer acorns, other nuts and fruits, but will visit corn, peanut and other crops, too. "In eastern North Carolina, bears will eat one row of peanuts and dig up another row to be drying for the next day," says Wildlife Commission biologist David Rowe.

In November or December, North Carolina's black bears begin denning. Dens can be hollow trees, rock crevices or piles of leaves on the ground. Denning bears fall in and out of a deep sleep, but they can be roused quickly. On warm late-winter days, they may emerge to look for food. When bears finally emerge from their winter sleep in March or April, they are very hungry. They will feed on almost anything available, including garbage, bird seed in feeders, a trace of grease on a backyard grill or pet food.

"May, June and April—in that order—are the worst three months for nuisance bears in the mountains," says Wildlife Commission biologist Joffrey Brooks of western North Carolina. "In eastern North Carolina, July and August are bad months because of the ripening corn crops."

These dispersing bears sometimes wander into settled areas but are not usually dangerous unless humans feed or provoke them. Bears will not stay in a settled area unless they find food. If a bear shows up in your backyard, biologists recommend that you keep your distance, keep children nearby, and keep pets locked up. If a bear changes its natural behavior (feeding, foraging or movement) because of you, you are too close. Never surround or corner a bear. If you happen to meet a bear at close range, back away slowly and make lots of noise.

Some of last fall's foraging bears ended up on the highways, where motorists collided with at least 40 of them. More than 60 bears per year are killed on North Carolina roads, mostly at night. Wildlife biologists advise motorists driving at night in bear country to slow down, use high beams and keep alert for movement on the sides of the road. Motorists who see a bear should put on emergency flashers, sound the horn, and slow down or stop. Drivers who hit a bear should not get out of the car, but should drive to a telephone and call the Highway Patrol or local law enforcement officers.

Although bears in town are usually not dangerous, people and pets can scare them up trees or provoke them to defend themselves. If people keep their distance, and the bear has a clear escape route to cover, a treed bear will usually leave when night falls. If a bear is injured, it should not be moved. Wildlife biologists should be called, and people and animals should stay well away from the bear.

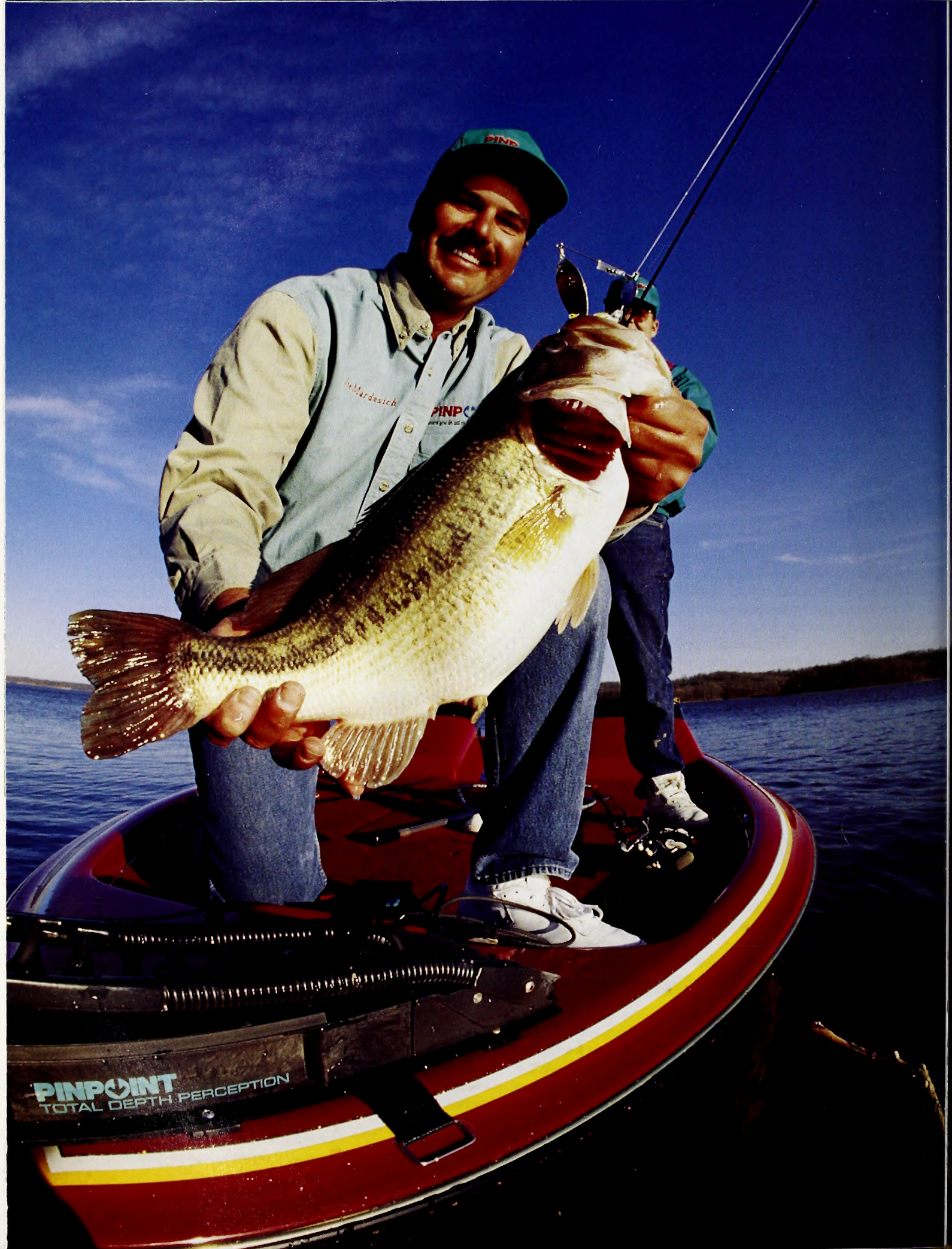
Wildlife biologists say that most people who learn about bears come to appreciate them. "I've gotten plenty of calls from farmers who just wanted to wipe out all the bears," Rowe says. "But after we worked on ways to prevent them from damaging crops, a lot of farmers accepted them as wildlife." Deer do far more damage than bears, biologists say.

Living peacefully with black bears may require some effort, but these black beauties are worth it. "These are the last of the big, wild creatures," Rowe says. "We need to make room for them. After all, bears were here before us." ⊠

For more information:
The free booklet Living in Black Bear Country *is available from the Division of Wildlife Management. Write: Bear Booklet, Division of Wildlife Management, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188; (919) 733-7291.*

To report wildlife violations, such as poaching or baiting, call 1-(800)-662-7137.

Calvin H. Allen is a reporter for the Fund for Investigative Reporting, a western North Carolina news service.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SMART MOVES *for* BASS

When to hold and when to fold? It's the bass angler's classic dilemma as well as the poker player's. Successful fishermen find that making their moves early pays off.

written and photographed by Soc Clay ©1998

It was hot. I mean really hot, and I'm not talking about the fishing, either. After a short period of refreshing coolness at daybreak, the morning had turned into a sauna, just like the day before and the day before that, with air temperatures exceeding 90 degrees.

Some anglers, the smarter ones, I thought, had taken the hint from Mother Nature that this was no time to be spending hours under the broiling sun. If bass had any sense at all, they must surely have dived deep to find relief. In my view, sunset, sunrise and the nocturnal hours in between were certainly a more fitting and a more productive time for fishing.

That's not the way Rick Clunn saw it, however. And neither did the 40 other contestants fishing the famed Bassmasters Classic, the most glamorous event in all of bassdom to many North Carolina bass anglers.

***Knowing when to** stay at a fishing location and when to move on can be as important in catching bass as setting the hook. Most veteran bass anglers agree that if a spot doesn't produce a strike during the first dozen casts, it's probably time to try another location. By making smart moves early on, you may be rewarded with a lunker bass like this one.*

Clunn, who has made history in these events, winning three Classic championships, was bound and determined to stick with his game plan for winning yet another, or get his brain fried trying.

"There's a patch of bass down there. If I can catch them, I can win the tournament right here," he told me. I had asked him why we were staying so long in a spot that appeared more apt to produce heat stroke than a stringer of bass.

Clunn's dilemma was one every serious bass fisherman faces time and again. Though he was reasonably sure there were at least some bass located in the neighborhood of a fishing spot, the big question was whether they would bite. Of equal importance to him—especially with tournament time constraints—was how much time should be spent trying to catch bass at any given location before moving on. In Clunn's case, the bass didn't cooperate, and he ended up far back in the race that day.

Veteran bass anglers are convinced that successful bass fishing—be it in a tournament or simply on a recreational fishing trip—is pretty much a finder's game. They believe the results of almost every bass tournament reinforce their belief that regardless of how tough the conditions are on a particular day, someone almost always comes in with a decent catch. In more instances than not, these fishermen know good fortune is due more to smart moves than it is to luck.

Over the years, I've talked with many of the state's finest bass tournament fishermen and guides, who have probed North Carolina's productive water. Most of them have an absolute rule for movement when fishing—if a spot doesn't produce a bite during the first dozen casts made to the most likely looking places, they leave. It won't produce, they believe, until the fish become hungry later on or the water and weather conditions change, causing the bass to become active.

These anglers were some of the first in the country to initiate the "run and gun" technique in bass fishing. This method entails selecting as many as 25 to 50 spots, either from personal knowledge or from studying a topographic map of the lake. They then allot a couple dozen carefully made casts to each location to search for active fish.

These veterans of the bass trail pretty much agree that moving from one location to another keeps enthusiasm high, often resulting in better coverage of the targeted area. These experts are confident they will find fish before the day is over by probing different depths, checking out varied structure and using a variety of lures and color

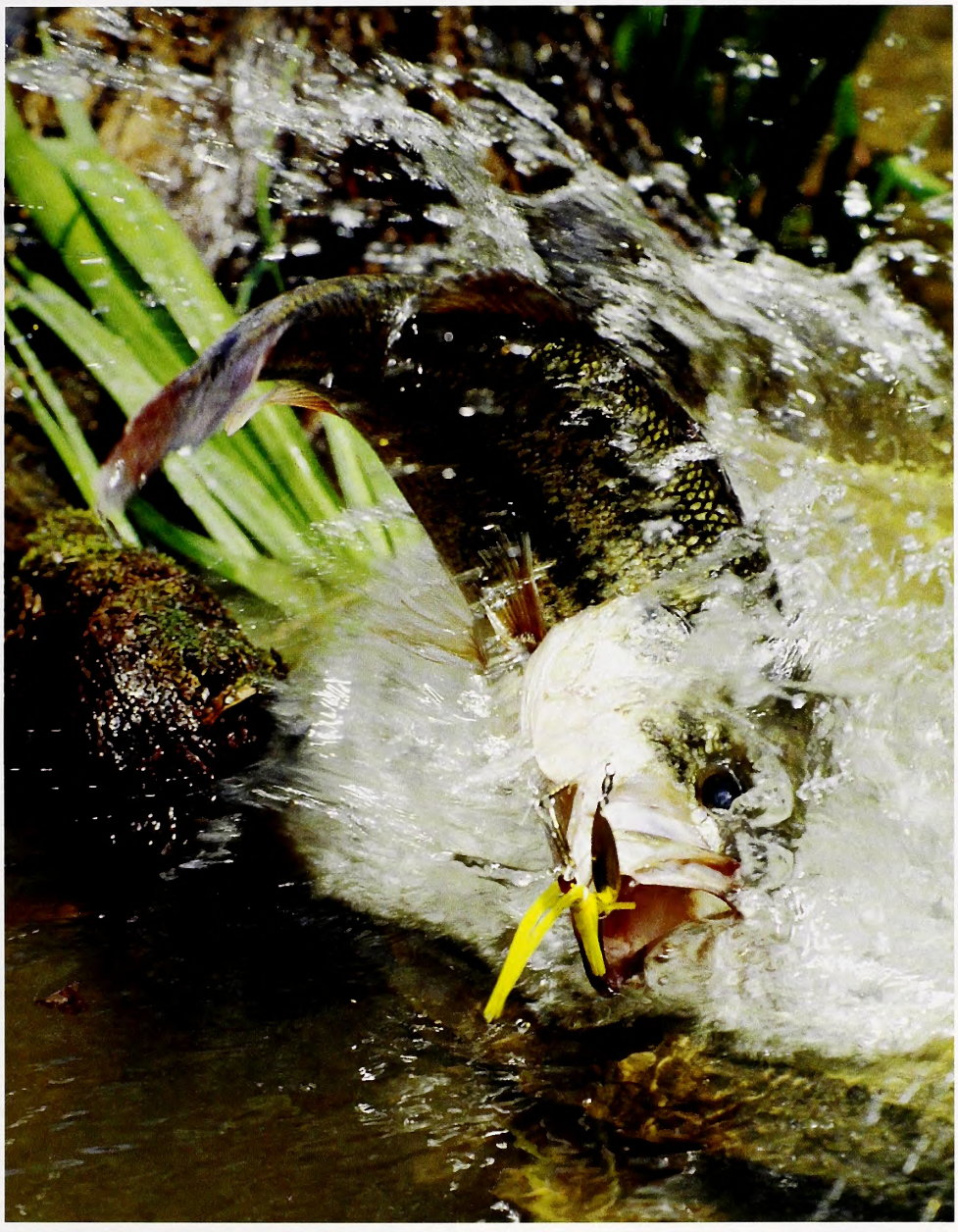
***Fly fishermen have** known for years that the best way to find actively feeding fish is to keep moving. The same rule applies to nearly all forms of bass angling no matter what type of casting equipment you're using.*

combinations. Like Clunn, most top bass anglers know that one good spot—if they are fortunate to find it—can produce enough bass to win a tournament or satisfy a paying fishing client.

One North Carolina bass pro who counts heavily on making smart moves for bass is 58-year-old Guy Eaker of Cherryville. Guy's been making moves on the bass population since he was 4 years old. Like most avid anglers, he was taught to fish at an early age by his father. Of course his dad just happened to be the late Earl Eaker, who has been recognized as one of the state's best live-bait bass fishermen of his day. Older anglers may also recall that Earl and Guy were the first to raise golden shiners commercially in North Carolina.

Learning from his father, Guy discovered early on that knowing when to move and when not to move can often make a big difference in the outcome of a day's bass fishing. In fact, about the only time he devotes more than a few minutes to a single spot is when it is surrendering a lot of fish or when he doesn't have fish located elsewhere. When this occurs, Guy admits he's playing the same waiting game as Clunn and others. Sooner or later, the fish in that spot are going to feed. The question is whether he has the time and patience to wait them out.

A former loading dock foreman who worked 26 years for Carolina Freight Inc. in Cherryville, Guy built his reputation as both a fishing guide and later as a full-time professional bass angler by absorbing the information his father passed along to him. A vital piece of that advice was to build a number of his own private fishing spots in his favorite lakes. That's nothing new, of course, since both bass and crappie fishermen have been sinking brush piles for years.



***A spinnerbait is an** excellent lure for quickly probing stumps, logs and submerged cover before moving on to the next prospective fishing spot. By quickly working each location with a variety of lures and well-placed casts, you can increase your odds of encountering a trophy-sized bass.*

Guy said the key, obviously, is knowing the best places to locate a submerged tree or sunken brush pile for optimal use by bass.

Some of the best spots, he said, are found on the lake side of a shallow cover or shoreline that contains enough structure to attract bass throughout early spring, in the spawning season and again during autumn. The structure must be situated in water between 6- and 12-feet deep and a good casting distance away from where everyone else is fishing. That's because when bass move off shallow structure, they will often drift back to the safety of the deeper cover. These spots also hold bass much longer into the summer. Guy said bass will position themselves on structure at this depth for several months, making them an easier target than fish that move into a deeper-water pattern.

Making what he calls his "milk run," Guy takes no more than a few minutes to check each of these man-made structures. More often than not, a small brush pile will hold only one bass, and he can usually tell by the first three or four casts if it's going to bite. In all, Guy may touch as many as 50 brush piles and other spots during a full fishing day. He is also convinced that when a bass is caught off a brush pile, a similar-sized fish will usually take its place in a matter of hours. For that reason, he sometimes revisits a productive spot before the day is over.

Man-made structures are so productive that Guy tries to find cover that other anglers have hidden as well as his own. Some of these more productive places are located close to docks, where owners will often sink brush within casting distance. To locate these sunken fish attractors, Guy looks for stationary rod holders to see which way they are pointing. This is an excellent way to know the direction of the brush pile. He then uses a Fat Free Shad or similar crankbait to sound the bottom until he hangs up on the structure.

His favorite quick-find lure for fishing the milk run is a 3/8-ounce Pro Excalibur spinnerbait with gold and silver blades that turn in opposite directions. "It's a totally new sound that bass haven't heard yet," Guy explains. The two blade colors going both ways provide a color combination that is new and exciting to heavily pressured bass. His preferred method is to cast the lure several feet beyond the target, allow it to drop to the correct depth, then retrieve it so it bumps the brush once or twice on the way back. Only a few casts are needed to see if there are active bass holding on the structure.

During a day's fishing, whether in a serious tournament or just to have fun, Guy said it is smart to check out point drops, ledges, weed lines, docks, man-made structure, sunken islands and sharp bends in creek and river channels.

A typical choice of lures to cover most of these locations is his favorite spinnerbait, a medium-size crankbait such as a black-and-pearl-colored Fat Free Shad Jr., a Texas- or Carolina-rigged Pro Ribbon plastic worm with a red shad finish, a 1/2-ounce Riverside black-and-blue jig with pork trailer and a 1/2-ounce C.C. Spoon for vertical jigging.

Equally important to Guy's milk-run success is a wide-view fish finder such as the Hummingbird Wide Vision Paramount LCR. A unit that shows the same angle of vision as the depth of water (20 feet deep with a 20-foot cone of vision) helps the longtime pro decide whether or not to fish a spot. Guy's rule is that if no fish appear on the screen, it's a waste of time fishing there.

A final move that Guy makes on the milk run is going to points, riprap areas and sharp turns in the main river channel when the power generators start pulling water. As current moves through a reservoir, schools of shad concentrate in places where moving water brings in zooplankton and other food. Active bass looking for an easy meal will also move into such areas. For Guy, this is the perfect situation to deploy a small crankbait with a shad finish. He reminds anglers that it's smart to work the lure with the current, not against it.

Because in bass fishing that may be the smartest move of all. ⊠

A Confusion of Woodpeckers

They seemed a lot like normal teenagers—you know, spiked hair, loud talk, unable to do a thing for themselves. But sometimes, the young downy and hairy woodpeckers looked almost Zenlike.

written by Elizabeth Hunter ©1998
illustrated by Kimberly K.C. Schott

Observing the creatures with whom he shared the world, New England essayist and poet Ralph Waldo Emerson found himself "moved by strange sympathies." "I feel the centipede in me—cayman, carp, eagle, and fox," he wrote.

I think I know what Emerson meant, and I wonder if he felt the woodpecker in him as well. I know I have.

Recently I've spent a good bit of my time watching woodpeckers from my home office window. From the clothesline that stretches halfway down the hill toward the woods, I've hung bird feeders and a suet cage and I keep a pair of binoculars at hand to keep tabs on what shows up. A second suet feeder is suspended on a hemlock branch a few feet from my windowsill, and I hardly need the binoculars to watch what happens there. It seems to be a wildly popular hangout for chickadees, titmice, blue jays, and for red-bellied, hairy and downy woodpeckers. As I sit at my desk, my eyes often alight on this avian Club Med.

The woodpeckers came to my attention last May when the hairies and downies that were my feeder's most faithful winter patrons introduced their offspring to its pleasures. One morning a young male downy overshot the feeder and landed on the window frame a couple of feet from my face. Head cocked, he gave me the once-over, first with his right eye, then his left. Then he turned his attention to the glass, tapping it experimentally. Its impenetrability puzzled him—and amused me, until my Emersonian sympathies kicked in and I saw it through his eyes. What a strange substance! Transparent yet solid—so different from the overcrowded black hole he'd lived in until recently and that he'd mistaken for the world's length and

breadth. What must it have been like to emerge into this vast, three-dimensional world full of color and light, swaying trees, buzzing insects and splendid contraptions like suet feeders?

Big confusing world or not, it didn't take long for him, his siblings and the just-fledged hairies to commit the suet route to memory. Not that they showed any immediate interest in feeding themselves. Like adolescent *homo sapiens* who hover in the kitchen waiting for their mothers to transfer pizza from refrigerator to microwave, woodpecker youth prefer that their harried parents extract peanut dough from a suet feeder and serve it. For about a week, two or three fledglings arrived each morning with their father or mother, positioning themselves strategically on nearby hemlock branches where they shivered their wings and begged for succor in ardent, piteous voices. Sometimes, while they waited, they practiced hopping along branches like inexpert gymnasts on balance beams, spreading their wings when they missed their footing, the way you throw out your arms to regain your balance.

Soon they became more adventuresome and tackled the tricky problem of landing on the feeder itself. Enthusiasm overcompensated for lack of grace as they belly flopped through the air, stumbling over twigs in their eagerness to claim the coveted foothold. Suspended from a branch by a slender, 6-inch chain, the feeder twists—first one way, then the other—after a bird lands. It must have made them dizzy.

A favorite trick was to land on one side of the feeder while a parent pecked away at the other. It always paid off. While siblings begged in vain from nearby limbs, father or mother absentmindedly stuffed the nearest mouth. The fledgling on the feeder almost never deigned to peck at the food staring him in the face.

I missed the episode in which the overworked parents finally said, "Feed yourselves, you overgrown louts!" But it must have taken place, because at last I saw that the fledglings were practicing self-sufficiency.

I missed the episode in which the overworked parents finally said, "Feed yourselves, you overgrown louts!" But it must have taken place, because at last I saw that the fledglings were practicing self-sufficiency. A few of the less ambitious persisted in the fantasy that they would never have to make their own way in the world, even after their parents turned a deaf ear. I even saw one deluded and desperate hairy fledgling doggedly pursuing a diminutive downy with a beakful of suet he had off-loaded for one of his own.

Even after the fledglings started feeding themselves, the young birds retained vestiges of babyhood around their mouths, though their hairstyles bore the teen imprint, swept upward spikily as if moussed. The males' little crowns sported twin pinkish streaks that looked like lifted eyebrows. Several times a day the youngsters sailed into the yard like a squadron of black-and-white paper airplanes. One landed on the window frame occasionally, perhaps harboring a hope that I could be enticed into waitressing as well as stocking the larder. Now and then one collided with the window, feet first, like a runner sliding into third base. But their mistakes became fewer and farther between.

Then it was the baby red-bellied's turn to receive the suet initiation. Unlike its mother and father, whose scarlet Mohawks were dazzling in the sun, its head was a pale taupe and looked bald. It seemed more helpless than the downies and hairies ever seemed, and I thought it might never draw close to the suet cage. Instead, it crouched on a thick branch or clung to the tree trunk begging for food, head bobbing like a mechanical toy. Its parents coddled it like the prized only child it appeared to be.

Occasionally when the parents were off somewhere, it forgot its obsession with food. It sat quietly then, alone on a branch, calm, looking curiously around—at leaves fluttering in a whisper of breeze, at chips of bright sky chinking the dark green canopy, at brazen blue jays stripping the cherry tree of its burgundy fruit. Watching it perched there, I wondered whether a baby bird—like a human baby—finds the world a marvel, a bemusement, a glory, as it launches into its own life and soars to its singular place. ⊠

Week Four to Week Five

Seasons of the Magnolia

photographed by Melissa McGaw

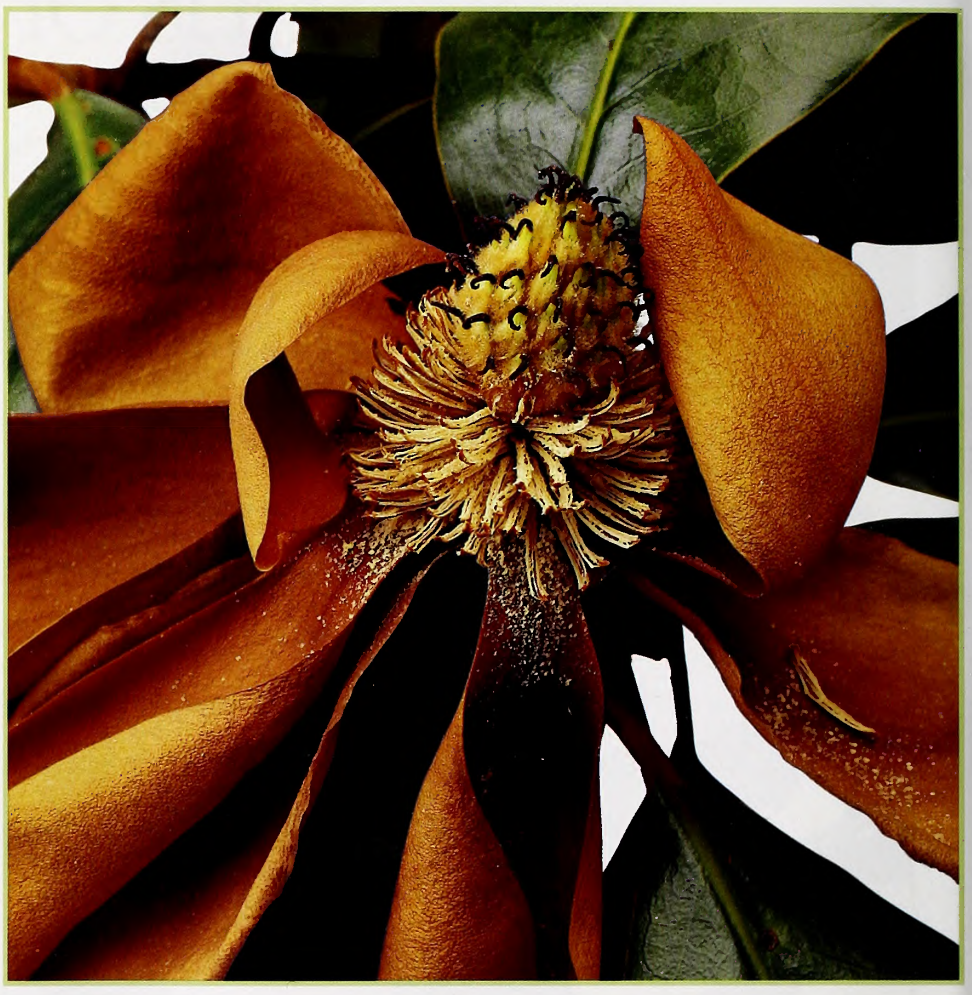
With a heavy, cream-colored blossom that emits a fragrance you can drown in, the Southern magnolia is the classic tree of the South. But have you followed these magnificent flowers through all their seasons? Watching a bud form in the spring is like watching a cloud take shape overhead. Sitting regally on its stem, the bud slowly changes color and suddenly, the huge petals widen into a saucer-like blossom that contrasts sharply with the rich green foliage. The spectacular flower blooms briefly, offering a message of timeless simplicity: Seize the day!

Week One

Week Two to Week Three

With beauty so bounteous, the flower's demise is shocking. The petals brown and collapse; the heady fragrance ceases. But the blossom's work has been done. A beetle, drawn by the flower's sweet advertisements, has crawled within and pollinated the flower. Through the summer, the fruit ripens until in its last autumn incandescence, the magnolia's florid seeds spill forth and hang by a thread. A bird is tempted. A seed is planted. A tree is promised.

Two to four days after bloom opens



Four to five days after bloom opens

One to two months after bloom opens

Three months after bloom opens

Sanctuary.

Between Cape Fear and Cape Hatteras, 19 mostly man-made islands are squawking with recovering populations of pelicans, gulls, ibises, herons and other water birds.

written by Phillip Manning ©1998
photographed by Walker Golder ©1998

Walker Golder guns the big center-console boat toward a nondescript island near the mouth of the Cape Fear River. The island rises no more than a few feet above the brown water. Beyond its sandy beach, whitewashed by the late-morning sun, the island is a mosaic of scruffy grasses and bare sand. Pale specks flit across the blue, cloudless sky above it.

Walker, who is manager of the National Audubon Society's North Carolina Coastal Islands Sanctuary, maneuvers the boat through the shallow waters with the nonchalance of someone who has done it many times. "Ferry Slip Island," he says. "Doesn't look like much, does it?"

"Something likes it," I reply, listening to a guttural cacophony that grows louder as we approach the island.

A minute or two later, Walker kills the outboard. As we drift toward the beach, the noise swells to a raucous din. Some of the specks I've been watching grow into royal terns, elegant white birds with black caps and orange bills. Others become laughing gulls, with black heads and gray wings. The birds swarm over the island, skimming the ground, then swooping effortlessly into the sky. This tiny patch of sand may be the busiest place I have ever seen.

"Hundreds of laughing gulls nest here, and 3,000 pairs of royal terns," Walker says.

I peer through my binoculars. Among the smaller birds sit brown pelicans—huge, immobile and silent as hood ornaments in the maelstrom.

"And a few pelicans," I add.

"Yes, 200 pairs," Walker says. More pelicans nest on this one island than there were on the entire North Carolina coast in the late 1970s. Of course, providing nesting sites for water birds is why we're here."

Between 1977 and 1988, nesting sites for colonial water birds declined dramatically along the North Carolina coast. Among the reasons for the decline was increasing human disturbance, to which water birds are especially sensitive.

Most water birds are colonial nesters—they gather in large numbers to lay eggs and raise their young. When a colony is disturbed, the birds leave their nests. If they are gone long enough, overheating or chilling can kill the embryos and nestlings. Because the nests are tightly clustered, just one person wandering around in a nesting area can destroy most of the eggs and chicks in a colony.

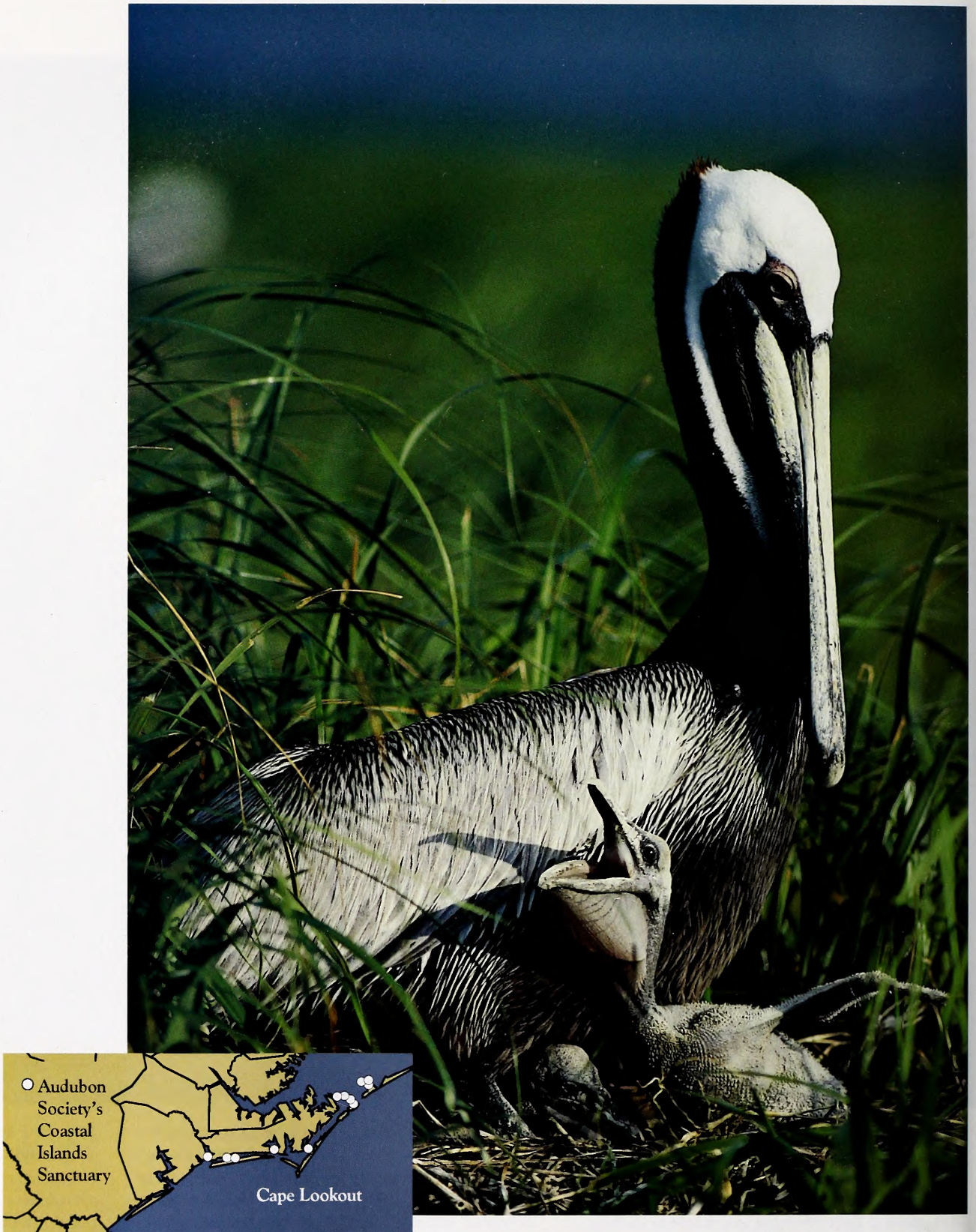
Repeated disturbances can cause the birds to abandon a site permanently. Within the past 20 years, water birds have deserted several of their

historic nesting areas, including Masonboro Island and South Topsail, as people stampeded to the coast for sun and fun. Since new nesting sites were not available, the result was bigger colonies at fewer sites, making the birds more vulnerable to storms, predators and intruding humans.

One of the first people to worry about the decline in nesting sites was Jim Parnell, a zoology professor at the University of North Carolina at Wilmington. Parnell discussed his concerns with other scientists, including Don McCrimmon, a Ph.D. zoology graduate from North Carolina State University. In 1979, McCrimmon was working for the National Audubon Society. After attending one of Parnell's conferences, he proposed that the Audubon Society add a new sanctuary to its system to protect water bird nesting sites on the North Carolina coast. The idea was accepted, and in 1982 the society leased two state-owned islands in the Cape Fear River.

Battery and Striking islands became the nucleus of a new sanctuary, which formally opened in 1989. Today, the Coastal Islands Sanctuary includes 19 islands between Cape Fear and Cape Hatteras, four of which are managed jointly with the N.C. Wildlife Resources Commission. Helped by volunteers, Walker Golder—the sanctuary's one full-time employee—

***This white ibis is a** good example of a once-threatened water bird species now experiencing a remarkable comeback. The growth of water bird populations is largely due to the efforts of the U.S. Army Corps of Engineers, which ensured that islands created from dredging became good water bird nesting sites. These efforts continue today.*



A brown pelican *watches over a newly hatched youngster. In addition to providing the nestling with warmth and nourishment, the parents also provide needed security against predators such as fish crows.*

must count nests, raise money to support the sanctuary, and shoo trespassers away. He must also look after the birds.

"See that pelican?" asks Walker, pointing to a listless-looking bird on the beach. "He may need help."

We hop out of the boat and wade ashore. The pelican watches us for a moment, then ponderously flaps away. Walker's young, tanned face relaxes. "He's okay," he says. "I was afraid he was tangled in fishing line."

As we hurry back to the boat to avoid disturbing the birds further, Walker points out a laughing gull nest. In the center of a brown cup lined with dead spartina grass are three olive-colored eggs streaked with brown. Both nest and eggs are nearly invisible in the grass. "In 1995 we counted over 20,000 laughing gull nests. Of course, we had to move fast so the birds weren't off their nests for long, and we may have missed one or two," he says, laughing.

We climb back into the boat. Walker starts the outboard. "Next stop, South Pelican Island," he says.

South Pelican Island is shrubbier than Ferry Slip, with a topping of high brush. In the tall grass and shrubs sit hundreds of pelicans, white heads flashing in the sun. "Pelicans like to nest in thicker vegetation than terns and gulls," Walker says. "Thanks to the U.S. Army Corps of Engineers, we have both kinds of habitat. In fact, without the corps, we wouldn't have much island-nesting habitat at all."

The Corps of Engineers is an organization that environmentalists love to hate. They blame it for damming wild rivers, almost destroying the Everglades and building sand-stealing jetties along the coast. To hear an employee of the National Audubon Society compliment the Corps of Engineers is like hearing a wetlands developer praise the Environmental Protection Agency. Nevertheless, the truth is the corps has played a big role in managing North Carolina's water birds.

The corps began serious dredging in North Carolina during the 1920s when it dug the channel for the Intracoastal Waterway. Dredging has continued ever since, as the corps maintains boat channels up and down the coast. The sediment sucked from the bottom, called dredge spoil, was usually pumped into shallow water, where it formed islands. The islands started as bare sand, but grasses and shrubs slowly invaded them, creating ideal waterbird nesting sites.

This serendipitous situation was disrupted in the mid-1970s when the corps began to dike spoil islands to minimize erosion. Fresh water collects quickly on diked islands, stimulating the growth of vegetation, and the islands soon become too overgrown for terns and gulls to nest there. Diking was another major reason water bird nesting sites declined.

As usual, Jim Parnell recognized the problem first. He asked the corps to stop diking islands that were important water bird sites. The corps agreed, and the result was a smattering of undiked dredge-spoil islands. Both Ferry Slip and South Pelican islands fall into this category, as do several other islands in the Coastal Islands Sanctuary. Without the corps' efforts, the sanctuaries wouldn't exist in their present form.

With help from the Audubon Society and other conservation agencies, the corps continues to try to accommodate the birds. On South Pelican Island, for example, it recently dumped spoil on only one side of the island so as to not disturb the pelicans' nesting site. In 1992, most of Ferry Slip Island had washed away, and the birds had abandoned it. After the corps pumped on more spoil, the birds flocked back.

But a problem has cropped up recently. Dredge spoil, which in the past the corps couldn't give away, has become a precious commodity. Seaside communities are begging for spoil to replenish their eroding beaches. So far, the corps has managed to satisfy both birds and people, but the day may come when it has to choose.

Our last stop is Battery Island, one of the sanctuary's original islands. Battery is a natural island, and its high ground supports a scraggly forest of yaupon and cedars. This habitat is favored by tree nesters—ibises, herons and egrets—and white blobs decorate every tree like pale Christmas ornaments.

"White ibises," Walker says. "Thousands of 'em."

We anchor the boat, and I join Walker on a patrol down the beach. He is looking for man-made hazards, the most common of which are humans themselves. Though "No Landing, No Trespassing" signs are posted regularly along the shore, people disobey them occasionally.

As we walk, we stay as far from the birds as we can to avoid disturbing them. Nonetheless, this is a stroll through a birder's paradise. We spot tricolored herons in one tree, egrets in another and a dozen little blue herons in a third. And everywhere we look, there are white ibises.

Ibises are mostly white birds with red faces, spindly red legs and long, decurved bills. Their crude twig nests are piled loosely in the trees, and black-headed chicks peep over the edge of almost every one. Each nest is guarded by an adult ibis, and farther down the beach we spot one of the reasons why. A fish crow perches on a sanctuary sign. Beneath it is an ibis egg with a hole pecked in it. "Fish crows love ibis eggs," says Walker.

Farther down the beach, Walker spots another hazard. He pulls two enormous balls of monofilament fishing line out of the sand. "I can't tell you how many dead birds I find tangled in this stuff," he says. "The birds either strangle themselves or die of starvation. Like crows, discarded fishing lines don't respect our borders."

"Fortunately, most people do," Walker says. "Since we began posting the island, the number of ibises nesting here has doubled to almost 18,000. Thanks to the conservation agencies along the coast, most water birds are doing well. All they needed was a little help, and I'm glad Audubon was able to participate."

Helping birds has been the aim of the Audubon Society for more than 100 years. North Carolinians have a particularly good reason to be grateful; this is the second time the organization has helped rescue the state's water birds.

By the turn of the century, plume hunters had slaughtered most water birds on the North Carolina coast. In 1903, only 1,700 water bird eggs were found.

Protecting North Carolina's Water Birds

Public lands are important links in the chain of islands that lie along the North Carolina coast. For the most part, these lands are controlled by conservation agencies, which protect and manage wildlife. In addition to the National Audubon Society, the following organizations provide habitat for water birds.

- **The N. C. Wildlife Resources Commission** monitors bird populations and manages nesting sites on 21 state-owned islands through its Nongame and Endangered Wildlife Program. The Division of State Parks also contributes to waterbird conservation by providing protection and nesting sites from Fort Fisher to Jockey's Ridge.

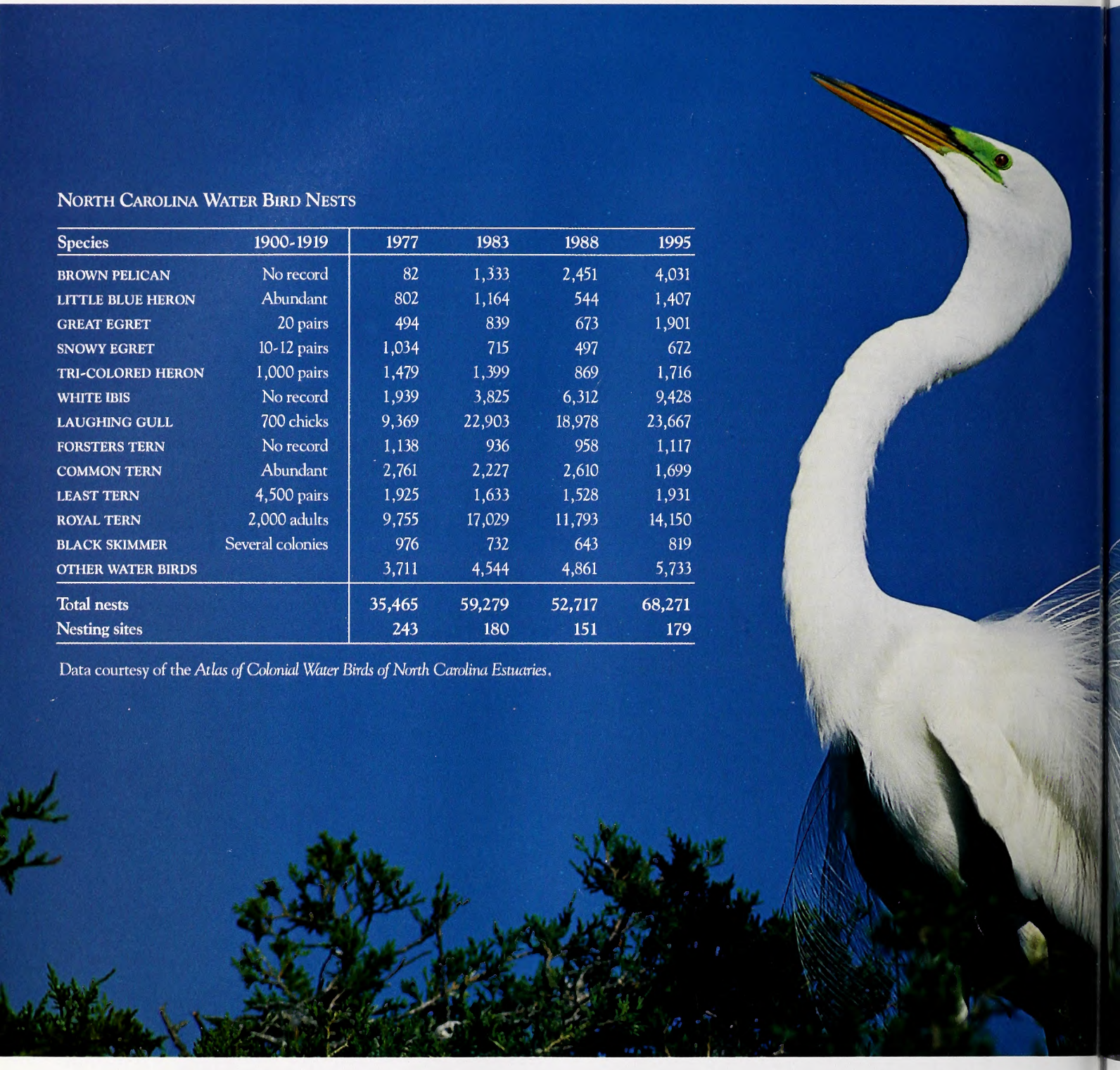
- **The U.S. Fish and Wildlife Service** maintains several refuges near the coast. One of them, Pea Island National Wildlife Refuge, is an important haven for water birds.

- **The National Park Service** protects water birds on the Outer Banks in its Cape Hatteras and Cape Lookout national seashores.

North Carolina Water Bird Nests

Species	1900-1919	1977	1983	1988	1995
BROWN PELICAN	No record	82	1,333	2,451	4,031
LITTLE BLUE HERON	Abundant	802	1,164	544	1,407
GREAT EGRET	20 pairs	494	839	673	1,901
SNOWY EGRET	10-12 pairs	1,034	715	497	672
TRI-COLORED HERON	1,000 pairs	1,479	1,399	869	1,716
WHITE IBIS	No record	1,939	3,825	6,312	9,428
LAUGHING GULL	700 chicks	9,369	22,903	18,978	23,667
FORSTERS TERN	No record	1,138	936	958	1,117
COMMON TERN	Abundant	2,761	2,227	2,610	1,699
LEAST TERN	4,500 pairs	1,925	1,633	1,528	1,931
ROYAL TERN	2,000 adults	9,755	17,029	11,793	14,150
BLACK SKIMMER	Several colonies	976	732	643	819
OTHER WATER BIRDS		3,711	4,544	4,861	5,733
Total nests		**35,465**	**59,279**	**52,717**	**68,271**
Nesting sites		**243**	**180**	**151**	**179**

Data courtesy of the *Atlas of Colonial Water Birds of North Carolina Estuaries*.



Breeding plumage, *like that of this great egret, led to the demise of many water bird populations by the turn of the century. The feathers were highly prized for use in women's hats and other apparel.*

Even common species were nearly wiped out: only six least-tern and no laughing-gull nests were found that year. A plume hunter summed up the prevailing attitude of the time: "The good Lord put us here and the good book says, 'Man shall have dominion over all creatures.' They're ourn to use."

But another hunter from Morehead City, noticing the decline in gulls and terns, pointed out a problem: "It's got so it hardly pays a man to hunt them any more. We ought to have a law to protect them until they can catch up their numbers again."

Into this charged atmosphere, stepped T. Gilbert Pearson. Pearson was a bird enthusiast, who had traded his collection of bird eggs and skins for tuition to Greensboro's Guilford College. He was teaching biology at the State Normal and Industrial College (today the University of North Carolina at Greensboro) when William Dutcher—the first president of the National Association of Audubon Societies—asked him to organize an Audubon Society in the state.

Pearson agreed, and the first meeting was held in Greensboro on March 12, 1902. When it ended, the Audubon Society of North Carolina had 148 members. The society's first order of business was to

get laws passed to protect nongame birds. Pearson lobbied legislators, spoke at meetings, and wrote newspaper articles. On March 6, 1903, the legislature passed the Audubon Bill, which delegated enforcement of game laws to the Audubon Society.

Pearson left the state in 1905 to become the first full-time, paid employee for the organization that later became the National Audubon Society. And in 1909, counties began taking over the Audubon Society's job of enforcing the game laws. Under the society's protection, water birds had started to recover, a trend that continues to this day.

We slog across a marsh back to the beach and spot a boat anchored offshore. A middle-aged man in Bermuda shorts stands in front of a sanctuary sign, snapping pictures and watching birds. The ibises in nearby trees are getting nervous, fluttering off their nests, then settling back down.

"This is a bird sanctuary, no landing, no trespassing," Walker says to the man, reiterating the message on the sign.

"Really?" the man replies. "I saw your boat and thought it was okay."

Walker explains the damage he could do by getting too close to the nests. The man looks chagrined. "Sorry," he says. "I didn't understand. The sign is hard to make out, but I'll leave now."

"You can enjoy the birds from your boat," Walker says. "That won't disturb them."

The man climbs into his boat and slowly cruises away, binoculars glued to his eyes.

"A lot of people forget how to read out here," Walker says wearily. "They're usually well-meaning folks. They just don't understand the damage they can do."

As we pull up anchor, a flock of a dozen ibises comes in low over the water, gliding by on graceful, black-tipped wings. They are followed by another flock and another and another. Walker sits down on the deck to watch the birds. "Sometimes, all the stuff I have to deal with makes me forget what's important. But when I get out here and watch the ibises coming in, I remember why I do what I do. It's useful work—and the birds are wonderful." ⊠

People are the most *serious threat to water birds. Many birds like this common tern lay their eggs in sand where careless drivers can crush them. The odds of a baby tern surviving without its parents are not high. If adult water birds are scared from their nests, young birds and embryos can also die by being chilled, overheated or eaten by predators.*

discovering Crayfish

Are these tiny crustaceans merely throwbacks to a primitive age? Not for a young boy with a hand-cut alder fishing pole.

written and photographed by
Harry Ellis ©1998

Which are smarter, men or machines? I ponder this question from time to time. I push a button on my TV and a picture appears on the screen, but just how it happens is as mysterious to me as quasars and black holes in space. When I turn the key to start my car, I am a little perplexed at the thought of all the things that take place before the wheels start turning. And just how my telephone works is totally beyond my comprehension.

My ignorance about mechanical and electronic wonders is total and complete, and I have no strong inclination to prevent it from remaining so. On the other hand, I eagerly desire to learn everything I possibly can about trilliums and mockingbirds, wood ferns, luna moths and crayfish. It is among these growing and living things that I feel most at home.

I remember when, as a small boy, I spent most of my summers along a certain country stream, with a hand-cut alder fishing pole. It was here that I became acquainted with a strange and interesting creature that I often found hiding beneath flat rocks in the shallow water. I called it a crawfish, though zoologists of today prefer the name crayfish. I was fascinated by its wildly waving claws, its long buggy-whip antennae, and its stalked eyes, an appearance suggesting some sort of mechanical robot from another age. I liked to watch crayfish move slowly and jerkily across the stream bottom, using their ability to walk forward, sideways and backward with equal facility, displaying a sense of instinctive caution in every movement. When alarmed, they would scoot backward until out of danger's way. All the passing years have not dimmed my interest in these fascinating creatures, and I now realize that these early ventures into the world of nature opened a great door for me that has never closed.

More than 200 species of crayfish are found in North America, and at least 27 species occur in North Carolina. Some kinds occur only in mountain brooks and streams, others in ponds, some in lakes and rivers and still others in swamps, marshes and wetlands. A few species live in the underground waters of deep caves. These crayfish are colorless and blind, having no need for eyes in the eternal darkness. The other senses are so well developed that blindness is no serious

Magnified several times, *this brightly colored crayfish* (Cambarus asper-manus) *climbs out of its burrow along a Piedmont stream. Twenty-seven different species of crayfish inhabit North Carolina, almost all living in or around streams, swamps, marshes and other wet areas. This species also occurs in the northwestern section of the state.*

***Not nearly as** distinctively colored as its cousin on the previous page, the common crayfish* (Cambarus bartonii) *is the most widespread species in the state. Crayfish are predators, preying on small fish, tadpoles, insect larvae and other small aquatic animals.*

handicap to these creatures.

Crayfish are confined almost entirely to temperate regions, being largely absent from the tropics. There are no crayfishes in Africa and none in the greater part of Asia. Classified as decapod crustaceans, they are the freshwater representatives of a group that includes marine crabs, lobsters and shrimps. A crayfish has four pairs of walking legs, plus a front pair of legs that are developed into huge, powerful pincers, used both for defense and fighting and for grabbing and tearing the prey. Two pairs of antennae enable the creature to appraise itself of its surroundings. The tough exoskeleton is periodically molted, or shed, as it grows. The hard, heavily armored and multi-jointed body has maneuverability and ease of movement.

Chiefly nocturnal, crayfish come out of their hiding places to feed at night along the streambed. During the day, they hide in burrows and under sheltering rocks on stream bottoms, often with just their heads protruding. With their great claws they can grab tiny fishes and other passing aquatic creatures without exposing themselves to danger from their enemies.

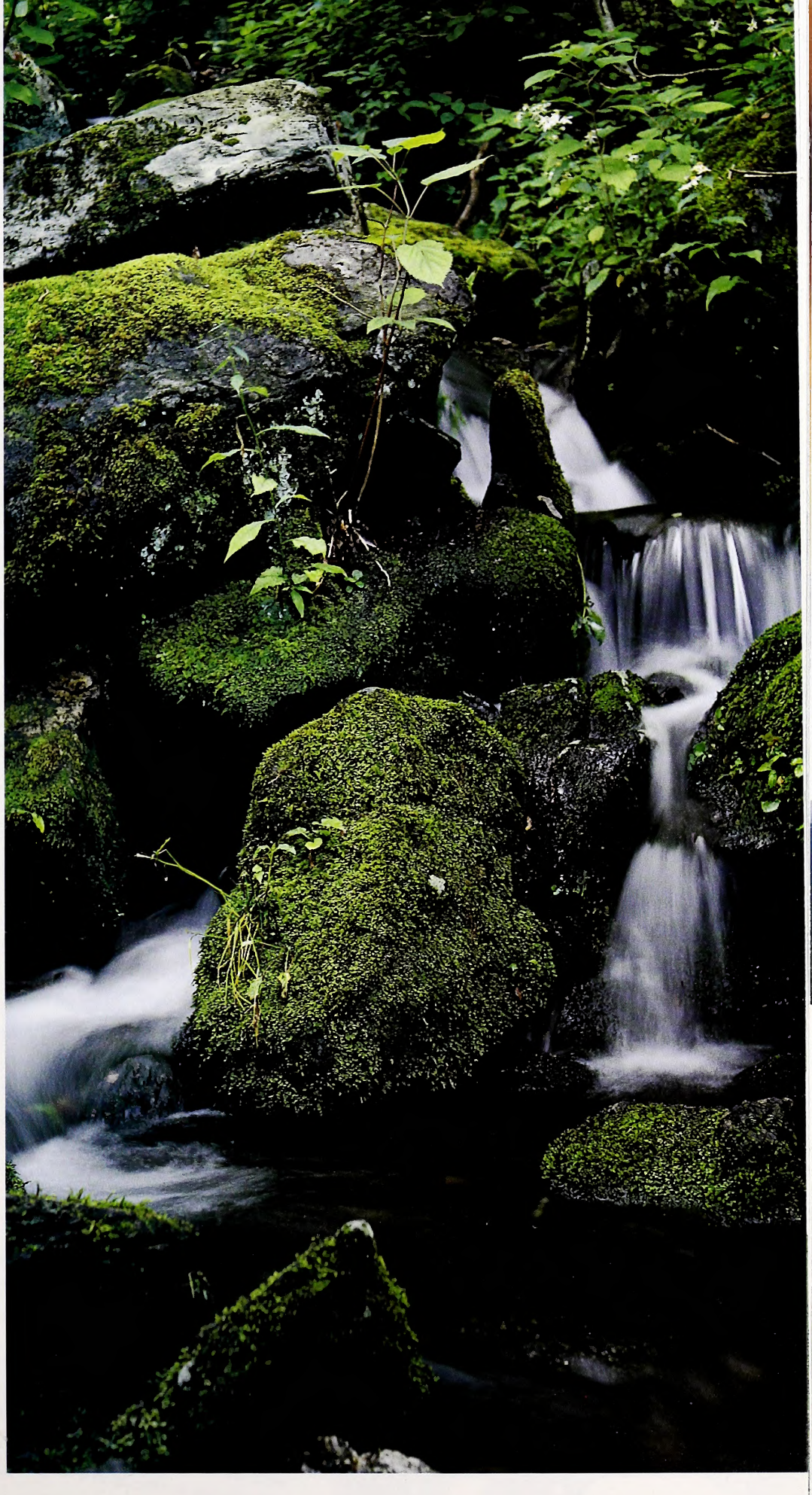
They are omnivorous predators and scavengers, eating almost any small animal they can capture—mostly fish, tadpoles, insect larvae, water snails and worms. They also eat small amounts of plant food. In fact, they will eat almost anything dead or alive. And if their filamentous gills remain moist, they can spend considerable time out of the water. When winter comes, crayfish become inactive and lethargic, hiding in burrows and under sheltering rocks on the stream bottom, moving little or not at all.

Scientists recognize these crustaceans as an important link in the ecological food chain of a stream. They feed on many smaller animals and are themselves eaten by fishes, frogs, turtles, water snakes, raccoons, minks, otters and large wading birds. Another predator is man himself. In Louisiana and other parts of the Deep South, crayfish are hunted at night for food, either for the tail meat—which some say tastes very much like shrimp—or to use in the soup known as "crawfish bisque." Both foods are a part of Louisiana's unique Cajun culture.

Crayfish get into fights with others of their kind, as evidenced by the fact that some of their feet and claws are often missing. But a lost leg or even an eye is no cause for concern, for these parts regenerate and in time will be replaced with new ones.

Breeding generally occurs in autumn but varies somewhat according to the species. When the female is about to lay her eggs, she goes into her burrow, turns onto her back and pours out a sticky fluid over the bottom of her abdomen and the

***Another common crayfish** species in the mountains is* Cambarus dubius *which has a deep blue coloration (right). Female crayfish carry their eggs attached to the swimmerets beneath their bodies (above). The eggs hatch in May or June, and the young spend much time hitchhiking rides with their mother.*



***Small, rocky mountain** streams shelter several crayfish species. As freshwater crustaceans, crayfish can move forward, backward and sideways on four pairs of walking legs. Their mobility makes them extremely efficient predators in the water.*

swimmerets. As the eggs emerge, she attaches them to these appendages beneath the tail, distributing them with the walking legs. When she comes out of her burrow in the spring, she may be carrying 200 or more berrylike eggs that usually hatch in May or June. The newborn young, tiny replicas of the adults, cling to the mother for some time, with her tail acting as a kind of nursery.

Most kinds of crayfish are colored in drab shades of brown and gray and, to the casual observer, one species looks much like another. A few species, however, are quite strikingly colored in bright shades of red, orange and blue, and these more easily attract attention. Very few species have ever been given common names.

In North Carolina, *Cambarus* is the dominant genus, with at least 18 species in the state. Three of the most common species are *Cambarus bartonii*, *Cambarus aspermanus* and *Cambarus dubius*. They are found in the section of the Blue Ridge Mountains that includes the Watauga River system, which rises west of Grandfather Mountain; in the Linville and its tributary streams; and in the French Broad River system and its eastern tributaries, the Toe and Cane rivers.

Cambarus bartonii, usually dull brown, is probably the most widespread and abundant crayfish in the eastern United States, and found in almost every stream in the region. *Cambarus aspermanus*, common in the northwestern section and in the Piedmont plateau of North Carolina, is a rather handsome, bright orange crayfish that is found in burrows in and along streams, and also under rocks in small, swift brooks. Also common in this section of the Blue Ridge is *Cambarus dubius*, often of a deep blue coloration. Because of its burrowing habits, it is difficult to see or to collect, but its turrets, or "chimneys," around burrow entrances are seen in wet meadows that border streams. Other burrowing "chimney" builders found in the state are *Cambarus diogenes* and the brick-red *Cambarus carolinus*, colorful but seldom seen.

Crayfish are marvelously adapted to their environments and the watery world they inhabit. They are of high interest to stream biologists, to casual observers with a fascination for the strange and the curious and most of all, to little boys and girls with alder fishing poles, whose eyes are just beginning to open on the wonders of nature. ⊠

Listen! What's that tremendous buzzing noise?

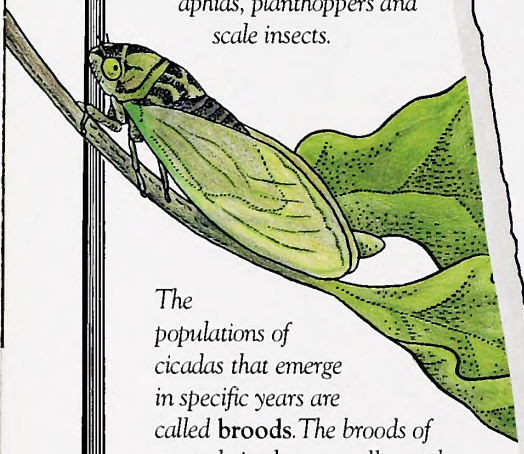
Summer's coming, and with it come. . .

Great Cycling Cicadas!

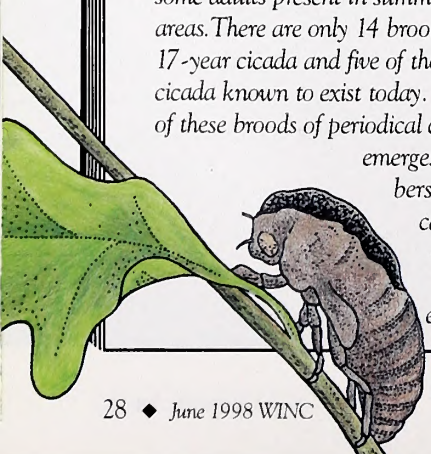
Written by Carlton Burke
Illustrated by Consie Powell

annual cicada

Cicadas are the largest members of the insect order Homoptera, which includes aphids, planthoppers and scale insects.



The populations of cicadas that emerge in specific years are called **broods**. *The broods of annual cicadas generally overlap each other so that there are always some adults present in summer in most areas. There are only 14 broods of the 17-year cicada and five of the 13-year cicada known to exist today. When one of these broods of periodical cicadas emerges, the numbers of insects can be overwhelming.*



empty cicada husk

They Came from Below. . .

It happened in a typical suburban neighborhood with neatly trimmed lawns and moderate-sized houses. Children played in their backyards while parents gardened nearby or chatted with neighbors. Pleasant spring days were gradually turning into the sultry days of early summer. That's when the peace of the neighborhood was disturbed.

Beneath the quiet neighborhood, strange underground creatures had begun to stir. The invasion began. It started slowly. Just one or two appeared at first, then more came. Wave after wave of six-legged, bug-eyed creatures began slowly but persistently to tunnel their way upward from beneath the ground. Within only a few days there were dozens of them, then hundreds, thousands, perhaps even millions!

For many years the Homopterans had led an unseen existence in the silence and darkness of their underground lair. But now they felt a compelling urge that they could not ignore. They pushed through the soil, ever upward. On arriving at the sunlit surface, they continued skyward by crawling up anything in sight: trees, fences, windows and doors. There they paused, gripping tightly to the surface with spiny feet, while the skins on their backs began to tear and split apart.

And then they emerged, large insects with bulging red eyes and long orange-tinted membranous wings. Left behind were the dried-out husks of their past lives still clinging to objects as if frozen in time.

The neighborhood was alive with their presence. They seemed to be everywhere —crawling, flying, lurking and hiding. Many were crushed by cars as they crawled across roads or collided with windshields. Despite the summer heat, doors and windows had to be shut tightly to keep the intruders out of houses.

Then much to everyone's relief, the creatures seemed to disappear from sight. In actuality they had merely flown high into the treetops.

Then the noise began. The Homopterans were signaling to one another. As the heat of the day intensified, so did the signaling of the strange big insects. Every day the loud and constant buzzing whir of massed Homopterans filled the air. Relief from the sound came only at night as the multitudes fell eerily silent. For days and days this continued.

Suddenly, almost as fast as they had begun, the insects fell silent. As the signaling ended, the insects began to die and fall from the trees. Their bodies littered the ground everywhere—on lawns, driveways and porches. The residents of the neighborhood used shovels, rakes and brooms to whisk away the dead. And life in the neighborhood began to return to normal. Or so it seemed.

The Homopterans were not truly gone. High in the safety of the treetops, they had left the seeds of a future generation. Homopteran invaders would return again on a summer day years from now.

cicada laying eggs

periodical cicadas

CICADAS: THOSE AMAZING HOMOPTERANS

Every summer, much of the eastern United States experiences the **emergence** of cicadas, insects with an amazingly long life cycle. Some 180 species make up the two major types of North American cicadas. The life cycle of **annual** (or dog day) **cicadas** spans five to 10 years. The life cycle of **periodical cicadas** spans 13 years or 17 years. Generally, the 13-year species live farther south than the 17-year species.

cicadas mating

FROM EGG TO NYMPH

The long life cycle begins when a female cicada uses her sword-like **ovipositor** to cut tiny slits in the tender bark of tree and shrub twigs. Eggs are deposited in the slits and left to hatch.

After hatching, tiny cicada **nymphs** fall to the ground where they quickly burrow deep into the soil and begin to feed on the sap of roots. Here they remain in their **subterranean** world anywhere from five to as many as 17 years, depending on the species. During that time they **molt** and grow.

newly emerged cicada

UP FROM UNDERGROUND

Nymphs usually emerge from underground in late spring to late summer, depending on the species of cicada. A fully mature nymph tunnels to the surface, then crawls up onto plant stems, tree trunks, or almost any other available surface. It firmly attaches itself with its claws and prepares to undergo one final molt. The skin on the nymph's back splits open and the fully developed adult cicada slowly emerges, soft and wrinkled like a butterfly that has just emerged from its **chrysalis**.

The dull-colored, wingless, crawling nymph has now been replaced by a bright and colorful winged adult cicada, measuring between 1 and 2 inches in length. Although the adult is now capable of flying, its flight is short. The cicada's main objective now is to fly high into the surrounding treetops to find a mate.

As a nymph, a cicada leads a very long life, as far as insects go. But when it changes to an adult, its life is nearing an end. Most adult cicadas only live a few weeks at most, just long enough to find a mate and reproduce.

cicada emerging

ROMANCE, CICADA-STYLE

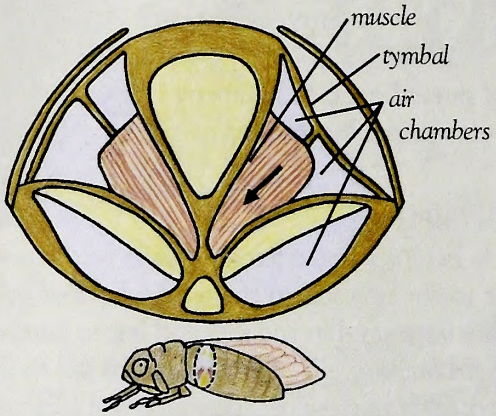
Once in the treetops, male cicadas search for females and advertise their presence and availability by calling. The sound produced by male cicadas is a steady buzzing hum, rising and falling in intensity. As the heat of the day increases, so does the intensity and volume of the calling. Females cicadas are attracted by the incessant loud buzzing and mating soon takes place. The female lays her eggs before she dies, and the cycle begins anew.

cicada nymphs

HOW DO CICADAS MAKE ALL THAT NOISE?

Chirping insects like crickets make sounds by rubbing parts of their bodies together. Cicadas use a different strategy, called drumming, that employs a complicated series of membranes and chambers within a male's abdomen. Muscles pull on special membranes called tymbals. As the tymbals flex in and out, they make rapid clicks that sound like a harsh buzz. Specialized air chambers in the abdomen transmit the sound to other membranes that amplify it. The result is an astonishing volume of sound for an animal of the cicada's size.

CICADA ABDOMEN: SIMPLIFIED CROSS-SECTION



What Does It Mean?

brood: populations emerging at the same time or of the same age
emergence: appearance above ground in order to complete a life cycle
annual cicadas: cicadas with a life cycle of five to 10 years that have overlapping populations so that some broods emerge every year
periodical cicadas: cicadas with a life cycle of 13 or 17 years that emerge in huge numbers at once
ovipositor: the egg-laying organ of a female insect
nymph: the immature form of insects that hatch from eggs looking like small versions of adults, but lacking only a few body parts
subterranean: underground
molt: to shed the outer covering of the body
chrysalis: the pupa life stage of moths and butterflies

Read and Find Out

- *Chirping Insects* by Sylvia A. Johnson, Lerner Publications Co., 1986.
- *The Encyclopedia of Insects* edited by Christopher O'Toole, Facts on File Inc., 1995.
- *Insect Metamorphosis: From Egg to Adult* by Ron and Nancy Goor, Atheneum, 1990.

In *Wildlife in North Carolina:*

- "The Cicada Killers" by Lawrence S. Earley, June 1984.
- "The Longest Wait" by Lawrence S. Earley, May 1994.

Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon.

Get Outside

Listen for cicadas: The treetop buzzing you'll hear in June is made by periodical cicadas. Remember how they sounded when you listen, later in the summer, to annual cicadas. Is there a difference in the way they sound?

Find nymph husks: Look on branches, tree trunks, or other vertical surfaces for the brown, empty husks of cicadas. If you remove them carefully, they won't break, and you will have a memento of a special insect's long life.

Make a cicada collection: Sharp-eyed naturalists may find dead or dying adult cicadas that have fallen to the ground. If you want to keep this insect as a specimen, first put it in a cool, dry place to dry completely for a week or two (in a container in the freezer works well). When it is dry you can store it permanently in a small box on some cotton.

Visit the Museum: Meet some cicadas on June 16, 17 and 18 from 11 to 11:20 a.m. at the N.C. State Museum of Natural Sciences in Raleigh. All programs are free. For more information, call (919) 733-7450.

You'll hear annual cicadas every summer, but 1998 is the magical 13th year for Brood XIX, the largest and most widespread brood of periodical cicadas in the Southeast. In North Carolina, this emergence is occurring throughout most of the Mountains and Piedmont. You won't have to listen hard to find them; groups of periodical cicadas can be heard up to one-quarter mile away.

Although the mass emergence of periodical cicadas may cause some headaches for humans, it is definitely beneficial for cicadas. Cicadas are preyed upon by many different animals, especially birds. But there are too many cicadas for predators to eat them all. Enough cicadas will survive long enough to reproduce their kind.

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Grasshopper Gravity: teaches students that wildlife occurs in a wide variety of forms, and lets students handle grasshoppers and crickets.

Wildlife Bibliography: teaches students how wildlife has influenced human society.

Wildlife Is Everywhere: teaches students that humans and wildlife share environments.

Get WILD

Upcoming advanced N.C. WILD workshops for educators include:

June 1-3—*Coastal Aquatic Ecosystems of the Lower Neuse River*. Camp Don Lee, Oriental. Laurieann Phalen. (919) 249-1106.

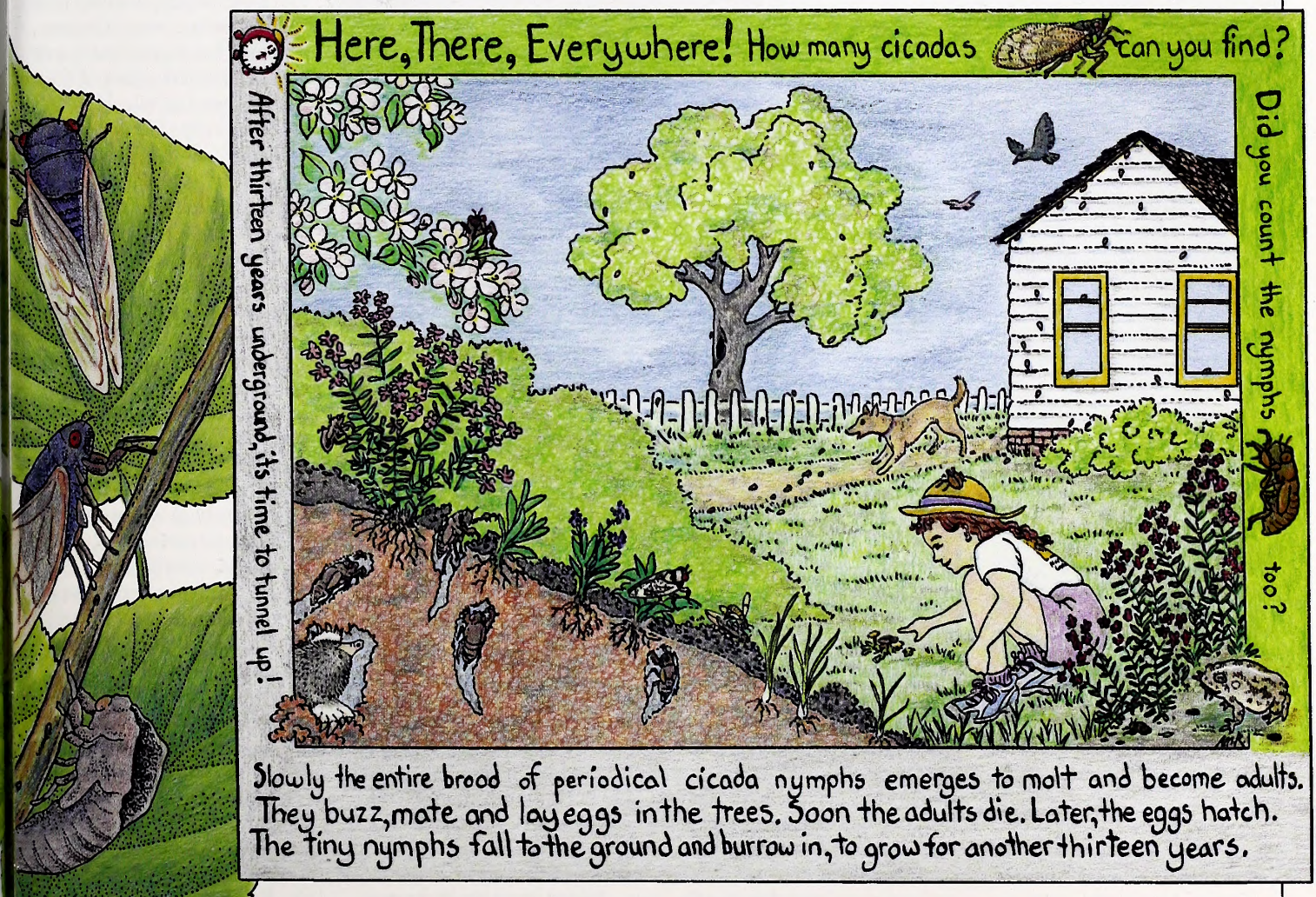
June 23-24—*Endangered Species*. Pisgah Center for Wildlife Education, Pisgah Forest. Laura Elliot. (828) 877-4423.

June 29-July 1—*Mountain Stream Ecology*. Pisgah Center for Wildlife Education, Pisgah Forest. Laura Elliott. (828) 877-4423.

July 7-10—*Wildlife Tracking Workshop*. N.C. Forest Service Training Center, Crossnore. T.M. Lemon. (336) 957-4382.

August 24-25—*Black Bear Workshop*. Statesville Arts and Science Museum, Statesville. Mary Bradford. (704) 873-4734.

To sign up or to learn more details, call the listed contact or check our web page at **http://www.state.nc.us/Wildlife/ConservationEd/wild/calendar/**



New North Carolina Waterfowl Stamp, Print Feature Currituck Club

"Currituck Club Canadas" *by Tom Hirata is the subject of this year's North Carolina waterfowl stamp and print. The print is the third in the N.C. Wildlife Heritage series.*

Edited by Rodney Foushee

The 16th edition of the North Carolina waterfowl stamp features a pair of Canada geese with the historic Currituck Shooting Club in the background. Artist Tom Hirata painted the scene. Hirata's painting, "Currituck Club Canadas," is the third in the North Carolina Wildlife Heritage series. The series of six stamps and prints will feature significant historical sites across the state that have played a role in the rich waterfowl traditions of North Carolina.

The Currituck Shooting Club, located near Corolla, is the oldest of several exclusive hunting clubs for which the Currituck Banks are famous. In 1857, a group of businessmen met in New York City to form the club, which included 3,100 acres purchased at $1 per acre from Abraham Baum. The original gable-roofed clubhouse was built that same year. After operating briefly, the club disbanded during the Civil War and local residents confiscated the club's guns and decoys and sold them to fund the Southern war effort. Though not damaged, the clubhouse fell into disrepair.

The Currituck Shooting Club reformed shortly after the war, and the present clubhouse and its surrounding buildings were built from 1879 to 1882. During its heyday at the turn of the century, the Currituck Club was at the center of much of the region's waterfowl market and sport shooting. Though the decline of waterfowl populations in the early 20th century led to the demise of many of the region's hunt clubs, the Currituck Shooting Club managed to survive.

Listed on the National Register of Historic Places, the club has been in operation for 131 years and serves as an important reminder of Currituck Sound's rich waterfowling heritage.

Hirata, a nationally known wildlife artist, has a long list of art credits to his name. His work has been chosen for 16 state waterfowl stamps including North Carolina's three times.

The N.C. Wildlife Resources Commission began its duck stamp and print program to raise funds for waterfowl conservation in the state, including acquiring and improving habitat. Purchase of stamps was voluntary until 1988. Since then, North Carolina waterfowl hunters have been required to buy a state stamp in addition to the federal duck stamp.

Money from the sale of state stamps and prints goes into the Wildlife Commission's Waterfowl Fund, which has raised more than $3 million since it began. The fund has helped in the purchase and improvement of thousands of acres of valuable wetlands, including Conine Island in Bertie County, Hunting Creek Swamp in Davie County and the White Oak Impoundment in Onslow County.

The money is also used to help North Carolina meet its financial obligations in implementing the North American Waterfowl Management Plan, the international agreement to help restore waterfowl populations throughout the continent. Funds have been used to support Canada goose research and to buy equipment used to manage wetlands.

State waterfowl stamps go on sale July 1 for $5 each. Prints can be purchases from independent art dealers for $141.

The Wildlife Commission continues to solicit ideas from the public for sites they consider worthy of celebration through the N.C. Wildlife Heritage series of stamps and prints. Send suggestions to: Duck Stamp Ideas, Division of Conservation Education, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C., 27604-1188.

North Carolina Student Projects Show Concern for Water Quality

How does a freshwater marsh function? Does air temperature have an effect on hatched sea turtles? Is a proper balance between plants and animals needed to maintain life?

These are just a few of the questions asked and answered by students around the state in this year's Natural Resources Conservation Science Fair projects.

The N.C. Wildlife Resources Commission's Division of Conservation Education and the Office of Environmental Education sponsor the projects, which are judged at eight regional science fairs held around the state.

Awards are presented to students whose science projects recognize the importance of natural resource conservation through interesting and innovative activities. Wildlife Commission personnel select the winners.

The science fair projects are prepared and presented by students under their teachers' guidance with the help of others interested in the science topic being explored. The fairs are coordinated by the N.C. Association of Science Teachers and the N.C. Math and Science Alliance.

In each region, $50 awards and a plaque are given to winners in the Elementary (grades 3 to 5), Junior (grades 6 to 8) and Senior (grades 9 to 12) categories.

Merit awards may go to any age category and include a plaque. The following students won regional science fair awards in 1998:

Region 1 Senior Division

Katherine Burke of J.H. Rose High School for "What are the effects of fertilizer nutrients on blue-green algae growth?"

Region 1 Junior Division

Robin Croskery of C.M. Eppes Middle School for "Pfiesteria hysteria."

Region 1 Elementary Division

Mark A. Jenkins Jr. of Sheep-Harney Elementary School for "A comparative study of soil erosion."

Region 2 Senior Division

Karen Pinson of Laney High School for "Does air temperature have an effect on hatched sea turtles?"

Region 2 Junior Division

Sarah Potter of Brewster Middle School for "Vermicomposting."

Region 3 Elementary Division (tie)

Abigail Boehling of Our Lady of Lourdes Catholic School for "Should the Atlantic blue crab peeler be protected by law?"

Region 3 Elementary Division (tie)

Jessica Nagle of Apex for "How does a freshwater marsh function?"

Region 4 Junior Division

Derrick Rice of Dublin Elementary School for "Is a proper balance between plants and animals needed to maintain life?"

Region 4 Elementary Division

Brad Evans of Fairmont Middle School for "Dunahoe Bay: A Carolina bay survey."

Region 4 Merit Award

Marc Moore of Booker T. Washington Primary School for "What lures a bass?"

Region 5 Senior Division

Colin Dietch of Rockingham County High School for "Using computers to simulate a natural environment."

Region 5 Junior Division

Amanda Dingman of St. Pius X School for "Water pollution in Greensboro."

Region 5 Elementary Division

Brian Quick of Marvin B. Smith Elementary School for "Can rabbits grow their own food?"

Region 6-Mecklenburg County Senior Division

Lisa Carrick, Valerie Johnson and Olivia Poole of West Charlotte High School for "Soil conservation devices on construction sites."

Region 6 Junior Division

Austin Patterson of Norwood Elementary School for "Get hooked on fishing!"

Region 6- Mecklenburg County Elementary Division

Wesley Spurr of Villa Heights Elementary School for "How healthy is our river?—A water quality study of the Catawba River."

Region 6 Elementary Division

Elizabeth Wear of Sacred Heart Catholic School for "Aquatic life comparison between a swamp and a lake."

Region 7 Senior Division

Steve Sexton of South Iredell High School for "Biofiltatration —A cumulative study."

Region 7 Junior Division

Cassidy Cobbs of Cranberry Middle School for "Windows to the South."

Region 7 Elementary Division

Sarah Steward of East Iredell Elementary School for "Stop that sediment in Fourth Creek."

Region 8 Senior Division

Elizabeth Ann McCulloch of Hendersonville High School for "Area lakes: Pollution."

Region 8 Junior Division

Jessica Sutton of Waynesville Middle School for "Testing water quality in Haywood County."

KEN TAYLOR

***Karen Pinson of Laney High School** near Wilmington is congratulated by Wildlife Commission education specialist Mike Campbell for winning a Natural Resources Conservation Science Fair award. Karen's project examined the effects of air temperature on hatched sea turtles.*

McCall Awards

Each year the N.C. Wildlife Resources Commission presents the Dr. William H. McCall Small Game Award to recognize individuals and groups that promote small-game management and conservation in North Carolina. This year, awards were presented to Wayne Short of Halifax County, Connie Jernigan of Wilson and the N.C. Council of Quail Unlimited.

Short, district conservationist for the Natural Resources Conservation Service, was honored for his efforts in promoting no-till farming throughout Halifax County. No-till farming not only reduces soil erosion, but also boosts wildlife populations by providing food and cover for small game and songbirds.

Jernigan, an avid quail hunter, has worked closely for many years with N.C. State University researchers studying quail in agricultural ecosystems. With his help, researchers have gained access to private farm land for various quail studies. Jernigan also served as a mentor to students working on the quail research.

The N.C. Council of Quail Unlimited represents 20 chapters across the state, and was recognized for its funding support of many small-game habitat improvement projects including the maintenance of fire lanes on the Sandhills Game Land, N.C. State University's small-game research project and the Farm Wildlife Recovery Program.

Statewide River Assessment Project Seeks Volunteers

A major assessment of North Carolina rivers is set to kick off this summer, but for it to be successful, one more ingredient is needed—you.

Volunteers are being sought to participate in the N.C. Rivers Assessment (NCRA) headed by the N.C. Division of Water Resources. Initiated in 1996 as a result of heightened public interest, the goal of the NCRA is to compile information on some of North Carolina's 50,000 miles of rivers. A pilot river assessment program has already been conducted on portions of the Neuse, Haw and Little Tennessee river basins. Now, North Carolina wants to take the plan statewide by seeking assistance from recreational boaters and organizations such as canoe clubs and environmental groups.

N.C. WILDLIFE RESOURCES COMMISSION

***The Scuppernong River is just one of** North Carolina's many scenic and historic waterways. Volunteers are being sought to rate North Carolina's rivers for their scenic and recreational qualities.*

"The people we are looking for are knowledgeable of their local rivers and streams and are willing to gather assessment data on rivers in their area," said Steve Reed, with the Division of Water Resources.

Teams of experts have been assembled to tackle technical categories such as wildlife, aquatic ecosystems and economic benefits. However, citizen volunteers will be needed to rate rivers' scenic and recreational qualities. The volunteers will be grouped into River Corridor Volunteer Assessment teams and evaluate rivers in segments. To assist the process, forms have been designed that are tailored to the geographic region being surveyed. Each form has a simple-to-use table that allows participants to indicate whether a section of river is forested, rural or urban. The table also has categories to denote different terrain, views, vegetation, special features and water flow.

The data collection is projected to continue through the summer of 1999. Once the information is compiled, the river will be ranked on a scale of one to five—exceptional, substantial, moderate, limited or unknown. Data from each of the categories will also be stored in a geographic information system database, which will be accessible through the Internet.

This database could be used to help guide development away from natural areas by showing potential industrial areas in a multi-county area with a certain level of water availability and quality. The database could also be used to display ratings for fisheries, wildlife and aquatic ecosystems. Or, the database could be used to guide funding decisions for additional boating access areas by displaying rivers that rank high for recreational use, fishing and scenery, but have limited public access. The information will also be used to coordinate river-management planning among local, state and federal agencies as well as tribal organizations. The database will be updated on a schedule to be determined.

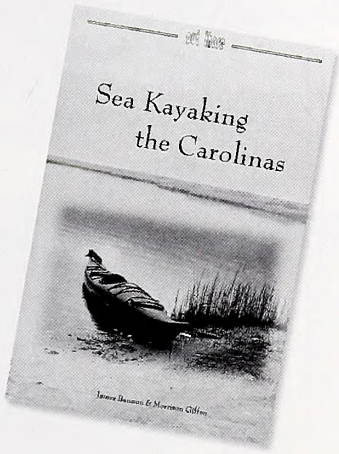
Reed said the river assessment project is important because "the NCRA will promote public awareness of rivers and their many values and give citizens an opportunity to participate in gathering important information."

For more information regarding the NCRA, call Reed at (919) 715-5424, or through e-mail at steve_reed@mail.ehnr.state.nc.us. The Division of Water Resources also has a home page for the NCRA on the Internet at http://www.dwr.ehnr.state.nc.us/~rivers/index.htm.

—Chris Powell

Book Review: *Sea Kayaking the Carolinas*

Sea Kayaking the Carolinas by James Bannon and Morrison Giffen, Out There Press, P.O. Box 1173, Asheville, N.C., 28802, 212 pages, paperback, 1997, $15.



To deny the popularity of sea kayaking is to seriously underestimate one of the fastest growing sports of the 90s. These nimble boats have opened up countless miles of rivers, bays and shallow backwaters for quiet exploration.

Though the Carolina coast has a wealth of varied natural habitats ripe for exploring, until recently there were no kayaking guidebooks dedicated solely to the region. Outdoor writers James Bannon and Morrison Giffen have teamed up to remedy the situation with their book, *Sea Kayaking the Carolinas*.

The authors compiled trips to 37 varied destinations in North and South Carolina. Details are provided on both day and weekend trips to nearly every imaginable location along the coast.

Each of the 70 trips included is given a difficulty rating of one to five, making the book a great resource for both novice and veteran paddlers. Information for each area is further broken down into sections that offer details on launch areas, campsites, potential hazards and sources of additional information. Maps and a brief history are also provided for each area covered.

For an excellent guide to a region that seems hand-tailored for the sport, it would be hard to go wrong with *Sea Kayaking the Carolinas*.

WHIP Helps Wildlife

Dear Wildlife:

The Natural Resources Conservation Service thanks *Wildlife in North Carolina* for using its January 1998 issue to inform readers about the Wildlife Habitat Incentives Program (WHIP). To help readers obtain wildlife habitat assistance from WHIP, here are some other important points not mentioned:

- WHIP assistance is available to any landowner, tenant or organization interested in developing habitat for wildlife. Applicants must be capable of providing habitat management for at least five years.
- In preparation for assistance, landowners should contact their local Farm Service Agency office to ensure that a farm number is assigned to the land to be managed for wildlife.
- Application for WHIP assistance can be made through your local NRCS agent stationed in your county's Soil and Water Conservation District office.
- WHIP gives priority to three general habitat improvement projects: 1) development of riparian buffers 2) substitution of native warm season grasses in pastures 3) reintroduction of fire into pine woods.

—Mary T. Kollstedt
State Conservationist, NRCS

Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

May 30-June 7

National Fishing Week will be celebrated across the country. Check local newspapers for events and activities in your area.

June 1-30

American Rivers Month will be celebrated around the nation. Check local newspapers for canoe trips, river festivals, fishing events and education seminars. For more information about activities to celebrate and heighten awareness of our rivers, contact the conservation group American Rivers, 801 Pennsylvania Ave. S.E., Suite 400, Washington D.C. 20003, or call (202) 547-6900.

June 1-July 19

An exhibit titled "Working Birds: Decoys and Their Carvers" will be on display at the Museum of the Albemarle in Elizabeth City. The exhibit features historic waterfowl decoys from Currituck, Dare, Hyde and Pasquotank counties that represent the distinctive style of northeastern North Carolina. For more information, call the museum at (252) 335-1453.

June 14-19

The 16th annual Fur, Fish 'N Game Rendezvous camp will be held at the Millstone 4-H Center near Ellerbe. Campers ages 12 to 15 will study topics including wildlife, forests, aquatic biology, game management and hunter safety. An advanced camp is open to youths who have successfully completed the first camp and are interested in an outdoor resources career. For more information, call Terry Patterson at (919) 515-3244.

June 20

A workshop titled "Finding Your Way in the Forest" will be held at the Wildlife Commission's Pisgah Center for Wildlife Education near Brevard. This hands-on program will focus on the basics of orienteering including compass and topographic map reading. For registration information, call the center at (828) 877-4423.

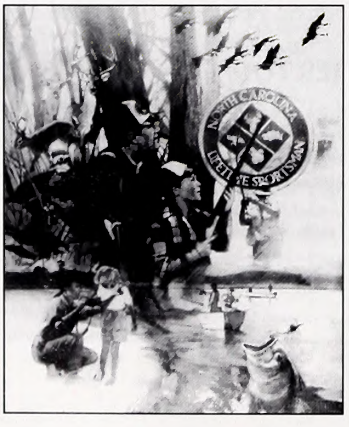
Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report



Totals Through March 1998

Principal Balance
$25,002,261.48

Interest Earned
$25,571,037.70

Total Receipts
$50,573,299.18

Interest Used
$12,329,807.04

Fund Balance
$38,243,492.14

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Leaving Wildlife Babies Alone

by Rodney Foushee

It's simple advice that can't be stressed enough this time of year—don't adopt baby wild animals.

Every June, wildlife agencies get flooded with calls from well-intentioned people who take in "orphaned" wild animals. Unfortunately, what starts with good intentions usually ends in tragedy for the wildlife.

Whether it's a deer fawn, a young squirrel or a baby bird, most young animals are rarely abandoned by their mothers and need little if any help from humans. Often the parent is nearby and will soon return to tend to the youngster if people don't intervene.

Fawn Follies: In the case of white-tailed deer, most fawns found by humans have only been left in secure places by their protective mother. The doe is often nearby and keeps her distance to avoid drawing attention to the young from predators. Because she has a much stronger odor and lacks the fawn's protective coloration, the doe spends only enough time with her baby during the first few weeks of life to feed it and keep it warm. Once the young deer is strong enough to run, it will join the doe.

Baby Birds: Though they may appear injured or in need, it is normal for young birds to hop around on the ground as they learn to fly. You should never remove baby birds or other wildlife from their native habitat. If birds fall out of their nests, you can protect them from cats and other predators by placing them high in shrubs or back into their nests. Contrary to popular belief, touching a baby animal will not cause its parents to abandon it.

Turtle Time: In the coming months a miracle will be repeated along our coast as thousands of baby sea turtles hatch from their nests. If you're lucky enough to witness this event, do not disturb the hatchlings with bright lights or try to "assist" them as they make their way to the ocean. Baby sea turtles have been making this journey for eons without human help.

It is illegal to harass wildlife and a special permit is required to hold wild animals in captivity. Since most wild animals make poor pets and don't do well when reintroduced into the wild, the best help you can give wildlife babies is to leave them alone.

N.C. WILD STORE

Explore the Mysteries of Nature

NATURE'S WAYS

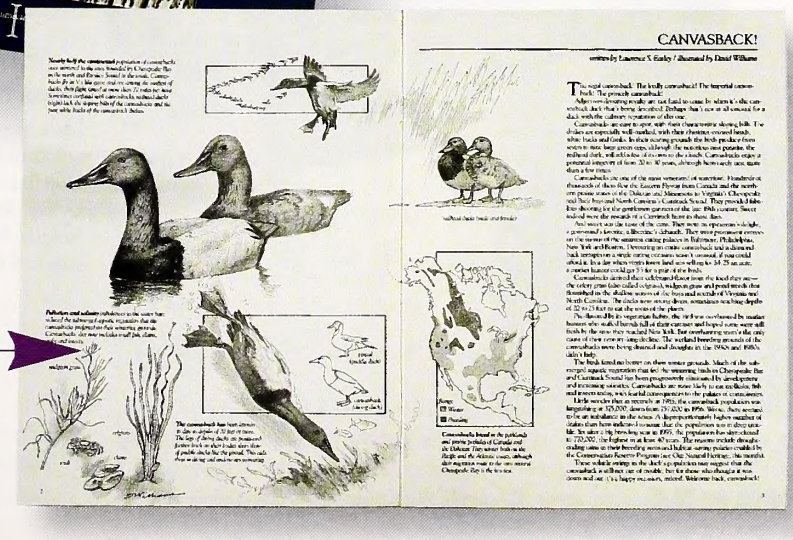
Natural History Essays from Wildlife in North Carolina

Why do some birds decorate their nests with snake skins? Why is the Roanoke bass found in only a few rivers in North Carolina? How did the ivory-billed woodpecker become extinct?

For nearly 20 years, the illustrated "Nature's Ways" columns in the pages of *Wildlife in North Carolina* have answered scores of questions like these in brief, entertaining essays. Now more than 200 of these essays have been collected in six paperback volumes that will delight readers, young and old, with their eye-opening insights into North Carolina's natural curiosities.

A wonderful gift for every nature lover!

Sold only as a 6-volume set. **$27.50.**
ITEM CODE **M9**



Short essays and beautiful illustrations have been the formula to the popularity of "Nature's Ways" over the years. This article on the comeback of the canvasback duck in North Carolina is one of over 200 articles in the collection. They can easily be photocopied and used in the classroom, and parents and children also can read them together at home.

More terrific items

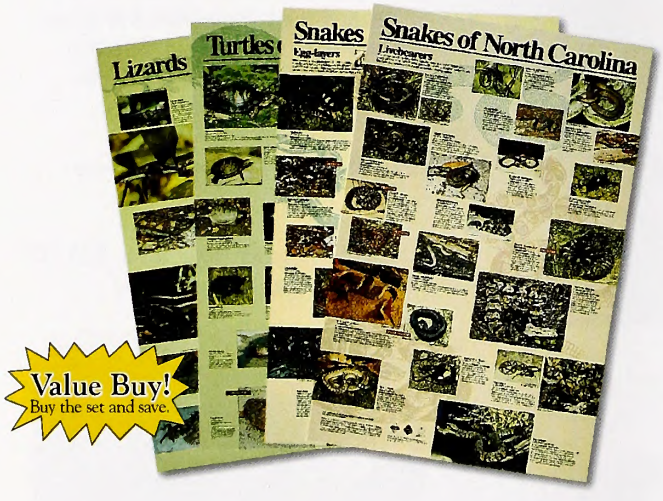
All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

White, 100% cotton (preshrunk) T-shirts are guaranteed for comfort and durability. Each shirt features an original design.

N.C. WILD T-SHIRT
N.C. WILD logo printed on front and colorful art on back. **$14.50.**
ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE IN N.C. T-SHIRT
WINC magazine logo on front pocket. Tundra swan art on back. **$14.50.**
ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)



LIZARDS OF N.C.
Shows all 12 of the state's lizard species. 22" x 34". **$6.** ITEM CODE **P3**

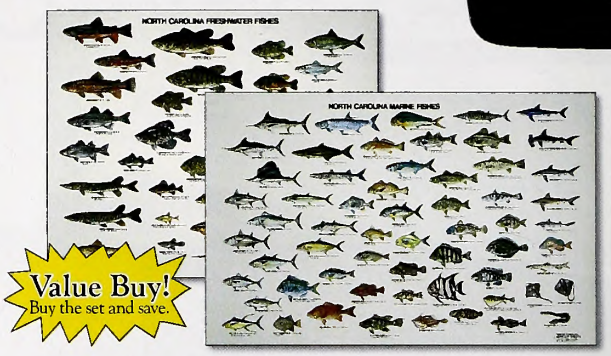
TURTLES OF N.C.
Shows all 21 of the state's turtle species. 22" x 34". **$6.** ITEM CODE **P4**

SNAKES OF N.C. (LIVEBEARERS)
Shows all 17 of the state's livebearing snake species. 22" x 34". **$6.** ITEM CODE **P5**

SNAKES OF N.C. (EGGLAYERS)
Shows all 19 of the state's egg-laying snake species. 22" x 34". **$6.** ITEM CODE **P8**

SET OF 4 POSTERS
You'll save $6 by purchasing the set of four posters above. **$18.**
ITEM CODE **P10**

N.C. WILD CAP
N.C. WILD logo is embroidered on a pro-shape, brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. **$16.50.**
ITEM CODE **A1**



N.C. FRESHWATER FISHES
Find your favorite fish with this color poster showing 36 of the state's freshwater fishes. 28" x 22½". **$6.** ITEM CODE **P6**

N.C. MARINE FISHES
All the colors of the sea can be found on this poster of 60 marine fishes. 35" x 22½". **$6.** ITEM CODE **P7**

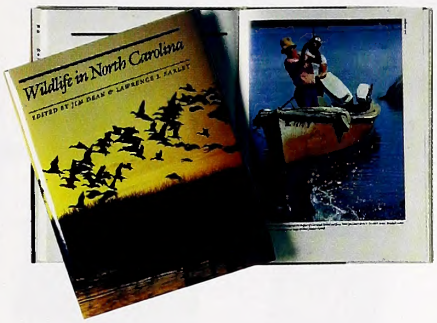
N.C. FRESHWATER FISHES AND N.C. MARINE FISHES
Save $2 when you buy both posters as a set. **$10.** ITEM CODE **P9**

WILDLIFE IN N.C. CAP
Buck deer silhouette with magazine logo is embroidered on a pro-shape, washed-canvas cotton cap with an adjustable cloth strap and buckle closure. Two-tone cap is navy/stone. **$16.50.**
ITEM CODE **A2**

DOGS THAT POINT, FISH THAT BITE
Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission; hardbound; 220 pages. **$19.95.** ITEM CODE **M8**

WILDLIFE IN N.C. CAP
Brook trout and magazine logo are embroidered on a sage-colored, premium weight, pigment-dyed, brushed cotton cap with an unstructured front, an extended bill, and a nubuck suede closure. **$16.50.** ITEM CODE **A3**

Wildlife in North Carolina Book



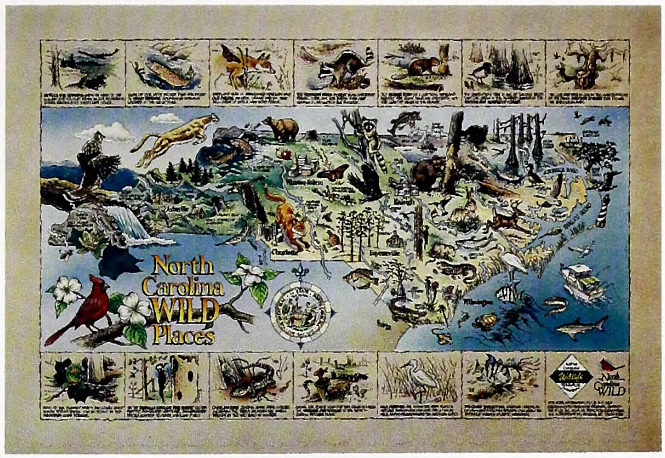
The best of *Wildlife in North Carolina* magazine. Hardbound. $12.
ITEM CODE **M3**

Magazine Binder

Store 12 issues of the magazine in this sturdy brown leather-look binder with gold lettering. $10.
ITEM CODE **M2**

Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.
ITEM CODE **M6**



North Carolina WILD Places Map

Artist's Proof. $40. ITEM CODE **E2**
Limited Edition. $25. ITEM CODE **E3**
Poster. $6. ITEM CODE **E4**

Value Buy!
Buy the set and save.

North Carolina WILD Places: A Closer Look Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. $6.
ITEM CODE **E7**

North Carolina WILD Places Posters

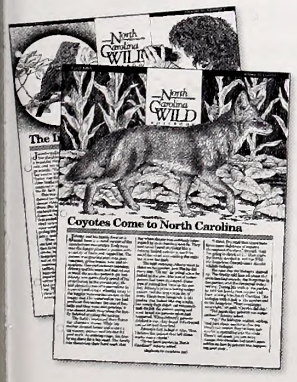
(Set of 3): Posters of "Old Field" and "Mountain Cove Forest" from *North Carolina WILD Places: A Closer Look*. 19½" x 16". Shipped folded with poster version of WILD Places Map. $8. ITEM CODE **E5**

North Carolina WILD Places: A Closer Look

Easy-to-read text and Anne Marshall Runyon's delightful illustrations make wildlife habitats come alive in this 82-page book. Discusses 13 habitats across the state. $10.
ITEM CODE **E1**

WILD Places book and posters

Buy the *North Carolina WILD Places* book and all three posters and save! (Items E1 and E5) $16. ITEM CODE **E6**



N.C. WILD Notebooks

Each set contains eight issues of *North Carolina WILD Notebook*, the Wildlife Resources Commission's prize-winning conservation education newsletter.
$3 per set.

1995-1996 Set ITEM CODE **E11**
1996-1997 Set ITEM CODE **E12**

North Carolina WILD Journal

Handy calendar notes on wildlife behavior through the year, with room for personal observations. Supplements N.C. WILD Education Sites workshop. $6.
ITEM CODE **E8**

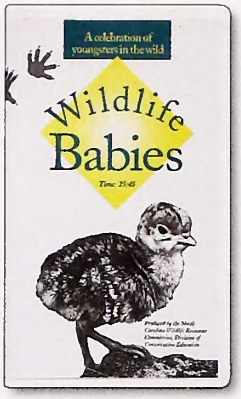
Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
Cub & Boy Scout Correlation. ITEM CODE **E9**
Girl Scout Correlation. ITEM CODE **E10**

More terrific items ☛

N.C. WILD STORE

Value Buy! Buy the set and save.



Wildlife Babies

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others. $20. ITEM CODE **N9**

Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. $2. ITEM CODE **M5**

All Things Are Connected

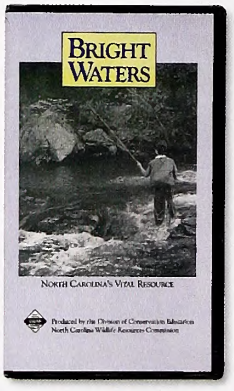
Stirring 12-minute video adaptation of Chief Seattle's speech introduces environmental ethics. $20. ITEM CODE **W1**

This Land Is Sacred (Teacher's Guide)

Classroom activities to accompany All Things Are Connected video. $4.50. ITEM CODE **W2**

All Things Are Connected & This Land Is Sacred

Video and Teacher's Guide package. $22. ITEM CODE **W3**



Bright Waters (Video)

30-minute video on fishing and fisheries management in North Carolina's freshwater creeks, rivers and ponds. $20. ITEM CODE **N7**

WILDlife Profiles

Each set is designed to fit your standard 3-ring binder and features 10 animal fact sheets. **$2 per set.**

Set 1. Black bear, raccoon, white-tailed deer, striped skunk, bobwhite quail, wild boar, muskrat, mourning dove, coyote, mallard. ITEM CODE **W4**

Set 2. Mink, canvasback duck, red fox, wild turkey, beaver, American river otter, Canada goose, bobcat, red wolf, cougar. ITEM CODE **W5**

Set 3. Humpback whale, black duck, osprey, clapper rail, red-shouldered hawk, cottonmouth, diamondback terrapin, largemouth bass, black crappie, channel bass. ITEM CODE **W6**

Set 4. Brook trout, garden spider, Tar spiny mussel, wood duck, bullfrog, mayfly, tiger salamander, bog turtle, hellbender, shortnose sturgeon. ITEM CODE **W7**

Set 5. Cottontail rabbit, gray squirrel, northern flying squirrel, newt, common crow, red-tailed hawk, prothonotary warbler, bluegill, striped bass, Eastern oyster. ITEM CODE **W8**

Set 6. Opossum, peregrine falcon, Eastern bluebird, American toad, rat snake, Eastern glass lizard, smallmouth bass, brown trout, monarch butterfly, Virginia big-eared bat. ITEM CODE **W9**

Set 7. Chipmunk, gray fox, bald eagle, loggerhead shrike, common snapping turtle, five-lined skink, bluefish, rainbow trout, grasshopper, horseshoe crab. ITEM CODE **W10**

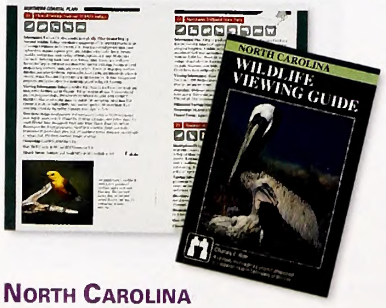
Set 8. Appalachian cottontail, manatee, barred owl, turkey vulture, Neuse River waterdog, spring peeper, coral snake, American alligator, American eel, American shad. ITEM CODE **W11**

Set 9. Southern flying squirrel, fox squirrel, great horned owl, snowy egret, Southern leopard frog, corn snake, Atlantic sturgeon, walleye, luna moth, crayfish. ITEM CODE **W12**

Set 10. Marsh rabbit, woodchuck, hooded warbler, whippoorwill, green salamander, copperhead, fence lizard, muskellunge, chain pickerel, Scotch bonnet. ITEM CODE **W13**

Set 11. Atlantic croaker, Southern flounder, summer flounder, spot, king mackerel, Spanish mackerel, sea mullet, weakfish, spotted seatrout, striped mullet. ITEM CODE **W14**

Set 12. Bay scallop, black sea bass, blue crab, brown shrimp, spiny dogfish and smooth dogfish, gag, hard clam, menhaden, sandbar shark, white perch. ITEM CODE **W15**



North Carolina Wildlife Viewing Guide

This color guide will lead you to 90 of the state's best wildlife viewing sites. $5.95. ITEM CODE **N6**

Protecting Our Wildlife Heritage (Video)

25-minute video offers useful tips for landowners on managing small game. $20. ITEM CODE **N8**

N.C. WILD STORE ORDER FORM

Use this form to order educational products. Use the magazine subscription form inside for magazine orders.

Provide your shipping information here. Please give a street address; we cannot deliver to a post office box.

Name _____ Home phone (___)___-____
first name MI last name area code

Mailing Address _____

Shipping Address _____

City _____ State ___ Zip _____-____

ITEM CODE	ITEM NAME/DESCRIPTION	SHIRT SIZE	QUANTITY	PRICE	$ TOTAL

Make checks payable to: N.C. Wildlife Resources Commission. Send your order to: The N.C. WILD Store, PO Box 29607, Raleigh, N.C 27626-0607.

All orders must be prepaid. We do not bill. Please do not send cash. Allow 4 weeks for delivery of your order. $20.00 service charge for returned checks (N.C.G.S. 25-3-512). Products may be purchased over the counter at The N.C. WILD Store, 322 Chapanoke Road, Raleigh, N.C. Telephone (919) 662-4377.

→ (Do not include magazine subscriptions.) ..... **SUBTOTAL**	$
→ (Subtract 15% for retail orders of $100 or more.) ..... **DISCOUNT**	$
→ (N.C. residents add 6% sales tax.) ..... **TAX**	$
→ (See shipping chart below.) ..... **SHIPPING & HANDLING**	$
→ (Add all items above.) ..... **TOTAL**	$

For credit card orders, provide information below.

CREDIT CARD NUMBER

EXP. DATE

( )
Daytime Phone Number

Credit Card holder's signature

SHIPPING & HANDLING MUST BE INCLUDED OR ORDER WILL BE RETURNED
Shipping and handling based on subtotal.
$10.00 and under, **ADD** $2.00
$10.01 to$25.00, **ADD** $3.50
$25.01 and over, **ADD** $5.00

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

LIFETIME LICENSES AND LIFETIME MAGAZINE SUBSCRIPTIONS

ENDOW 98

Complete form and mail with proper payment to: Wildlife Endowment Fund, N.C. Wildlife Resources Commission, PO Box 29565, Raleigh, NC 27626-0565.
Office is located at 322 Chapanoke Rd., Raleigh, NC 27603. Telephone 1-888-NCWILDLIFE or 1-888-629-4535.
Please make checks payable to the Wildlife Endowment Fund. $20 service charge for returned checks (NCGS 25-3-512).

PRICE

- ☐ Lifetime Comprehensive Fishing (residents only) (includes basic fish, trout and trout waters on game lands) $250.00
- ☐ Lifetime Subscription to *Wildlife in North Carolina* magazine $100.00

Infant and Youth Licenses:

- ☐ Lifetime Sportsman Infant (under 1 year of age) (Application must be received before one year of age) $200.00
- ☐ Personalized Lifetime Sportsman Infant (under 1 year of age) (Application must be received before one year of age) $205.00
- ☐ Lifetime Sportsman Youth (age 1 through 11) (Application must be received before 12 years of age) $350.00
- ☐ Personalized Lifetime Sportsman Youth (age 1 through 11) (Application must be received before 12 years of age) $355.00

A copy of a certified birth certificate (or the mother's copy) must accompany applications for sportsman's licenses for infants and youths.
Please note: Hospital copies will not be accepted. Also, birth certificates cannot be returned.

Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult at least 21 years of age, who is properly licensed to hunt in North Carolina. "Accompanied" is defined as being able to take immediate control of the hunting device.

- ☐ Lifetime Sportsman (residents only) (age 12 or older) (includes basic hunt and fish, big game, game lands, primitive weapons, trout, N.C. waterfowl [Federal waterfowl stamp is mandatory and must be purchased separately.]) $500.00
- ☐ Personalized Lifetime Sportsman (residents only) (age 12 or older) $505.00
- ☐ Lifetime Nonresident Sportsman (age 12 or older) (includes basic hunt and fish, big game, game lands, primitive weapons, trout, N.C. waterfowl [Federal waterfowl stamp is mandatory and must be purchased separately.]) $1,000.00
- ☐ Lifetime Comprehensive Hunting (residents only) (includes basic hunt, big game, game lands, primitive weapons) $250.00

On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or making out a written statement that he had such a license.

Check appropriate block and attach required copy

☐ Copy of Prior Year Hunting License ☐ Copy of Hunter Safety Certificate of Competence
☐ In lieu of copy, I am completing a written statement (complete below).

STATEMENT: I CERTIFY THAT I WAS A LICENSED HUNTER PRIOR TO JULY 1, 1991.

Date _____ Signature of Applicant _____

PLEASE TYPE OR PRINT LEGIBLY

Applicant Name: _____ (First) (Middle) (Last)

Address: _____ (Street/R.F.D.) (City) (State) (Zip)

Date of Birth _____ (Month/Day/Year) Social Security No.: _____ Driver's License No.: _____

Male: ☐ Female: ☐ Telephone Number: (___) _____ County _____

_____ Date _____ Applicant or Donor Signature

If a personalized lifetime sportsman's license is being ordered, please indicate your selection of letters, numbers, dashes, periods, commas and/or blanks. Only six spaces may be used.

___ ___ ___ ___ ___ ___

The personal message for the personalized sportsman's license may include up to 21 spaces, including letters, numbers, dashes, periods, commas and/or blanks. Please write in your message as you wish it to appear.

N.C. Wildlife Resources Commission Merchant #8430 0755 0
To charge your purchase to your VISA or MasterCard you MUST complete the form below (donations cannot be charged).
Card Holder's Name and Address (Please Print)

_____
_____
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_____

☐ VISA ☐ MasterCard
Expires____/ ____ Acct. No. _____
Card Holder's Signature _____

Donor's Name and Address (if applicable)

_____
_____
_____
_____

I wish to make a tax-deductible contribution to the Wildlife Endowment Fund.
Enclosed is a check for $ _____. Please make checks payable to the Wildlife Endowment Fund.

MasterCard

VISA

DO NOT WRITE IN THIS SPACE FOR COMMISSION USE ONLY

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_____

Lifetime License $ _____

Lifetime Magazine $ _____

Total Charge $ _____

Authorization Code Number

_____

Wildlife Commission

Spotlight

Time to Burn

Prescribed fire creates excellent nesting and brood habitat for ground-nesting birds such as quail and turkey."

Rising From the Ashes.
Prescribed burning is an excellent investment in wildlife habitat. Included in these benefits are improvements in the growth of native grasses, forbs and legumes as well as control of woody vegetation. These burns create excellent nesting and brood habitat for ground-nesting birds such as quail and turkey. Browse and forage are also produced for herbivores like deer and rabbits.

KEN TAYLOR

N.C. WILDLIFE RESOURCES COMMISSION

Burning Time.
To reduce the risk of nest destruction by prescribed fire, N.C. Wildlife Resources Commission biologists recommend that April 1 through June 15 be fire free, unless special circumstances dictate otherwise. By conducting burns only before and after this period, managers can achieve habitat objectives while giving wildlife an opportunity to nest.

MELISSA McGAW

Nothing Ventured, Nothing Gained.
Investments involve risk, and controlled burns are no exception. Some of the best times for burning are late winter and spring, which coincide with nesting periods of many species of ground-nesting birds and mammals. Late winter and spring burns, called growing-season burns, have the potential to destroy nests. Even so, the positives far outweigh the negatives, because nesting wildlife need open grassland habitats, which historically have been formed by wildfires. Ground-nesting birds have evolved the ability to re-nest during the spring and summer to compensate for nests destroyed by fire. And the cottontail rabbit is legendary for its prolific reproduction.

Breaking and Entering

Hardly bothered by a swarm of angry bees, this blissful black bear is enjoying the spoils of a honey raid.

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WILDLIFE IN NORTH CAROLINA

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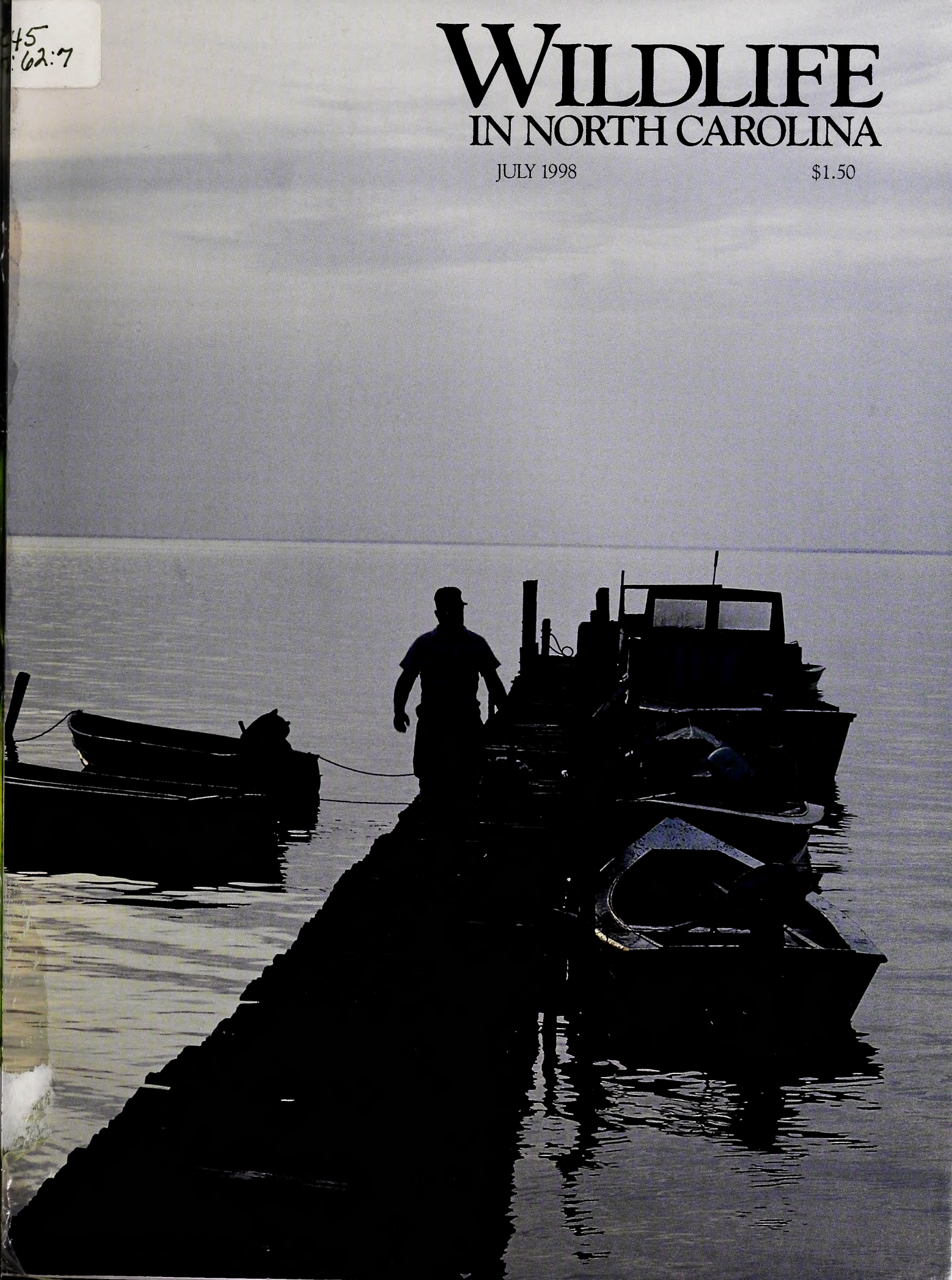

A T'angling We Go

by Jim Dean ©1998

ILLUSTRATED BY JACKIE PITTMAN ©1998

"It is a miracle that anyone has the patience to fish, much less that they become absorbed in it enough to do so more than once."

I have not researched the origins of the word "angle" beyond Webster's unabridged dictionary, but the various definitions found there are not wholly satisfactory. The angle is the fishhook, with or without the line and rod (archaic), but the meaning has also expanded beyond the gear to the act of fishing—though Webster footnotes this usage as rare. Daniel Webster, himself an obsessive angler, would no doubt have found that amusing.

I can't prove it, but I also am highly suspicious that the word "tangle" is little more than a corruption of "to angle." The evidence is purely anecdotal, but you don't have to angle more than a few minutes to experience an anecdote. Regardless of the mode of fishing I choose, I seem to remain in a more or less continuous state of entanglement. A cast that does not wind up in some tree, stump or bush (complete with an active wasp nest) is very likely to intercept a submerged limb, lily pad, gob of green algae or some other fisherman's abandoned line before I have managed to retrieve it. It is a source of wonderment that the various hooks and lures I use are ever unencumbered long enough to perform their intended tasks. Am I alone here? I think not.

One of our oldest forms of angling is fly fishing, predating bait-casting reels by several hundred years, likely far longer, and preceding spinning by another 75 or so. The modern fly rod is a wondrous piece of equipment; in theory, at least, it is capable of casting a fly 100 feet or more. Yet, there I was on a bright, windy afternoon this past spring trying to make a cast half that distance to a spot where I had seen a very large spawning bass swirl in a shallow pocket against the shoreline.

With the windblown boat spinning on its anchor, I made half a dozen fruitless attempts to place a bug over that bass.

An earlier effort had been carried into a tree two dozen feet down the bank by a sudden gust, another had snared the hook in a guide and tightly twirled 30 feet of line and leader around the rod. My last had left me nesting in loose coils of line with the bug stuck in the back of my shirt. After I cut the bug out of my shirt, and redressed, I noticed that I had four hopeless windknots in my leader. "To hell with fly fishing," I said. (I am pretty sure a similar sentiment led early Kentucky watchmakers to craft the first revolving-spool bait-casting reels.)

Still determined to present some enticement to that bass, I picked up a casting rod that had already been rigged with a soft plastic salamander. My cast would have been perfect had I not experienced what is optimistically called a professional overrun. The salamander shot towards the target, stopped abruptly at the zenith of its arc and plummeted like a gut-shot cormorant. I picked fretfully at the loose loops of line on the spool until the reel was barely visible. History does not record the first occurrence of a backlash, but my guess is that it took place in the last century simultaneously with the watchmaker's first test of his new invention. And it was probably he who remarked how much the result resembled a bird's nest. I began to cut line until 50 yards lay around my feet in short hanks like hair around a barber's chair, then realized there wasn't enough good line left on the reel to reach the bass. "To hell with bait-casting," I said. (Was a vexed Frenchman likewise encouraged to invent the first spinning reel?)

There was another vigorous swirl next to the bank. That bass was hot for trouble. I picked up Europe's contribution to angling and fired a cast. The plastic worm sailed straight and true, but began to falter as an unnoticed loop on the perimeter of the spinning reel leaped off and dragged a wad of twisted monofilament through the guides with a dry flutter that sounded like a dozen dragonflies mating in a paper sack. The worm fell short. Bunched at the third guide was what appeared to be a large silvery wig. My friend Jack calls this, appropriately, a bouffant. And if you think we carry knives to clean fish, think again.

It is a miracle that anyone has the patience to fish, much less that they become absorbed in it enough to do so more than once. Would you not think, with the energies and intellects of countless anglers more or less constantly entertained all this time, that we would have made some noticeable advance in developing tackle and attendant skills that resist such tangles?

Perhaps this is why the truly contented fishermen I know use nothing more elaborate than a cane pole, cork, split shot and hook. I would do so myself, but I can't figure out how to connect all those components without using line.

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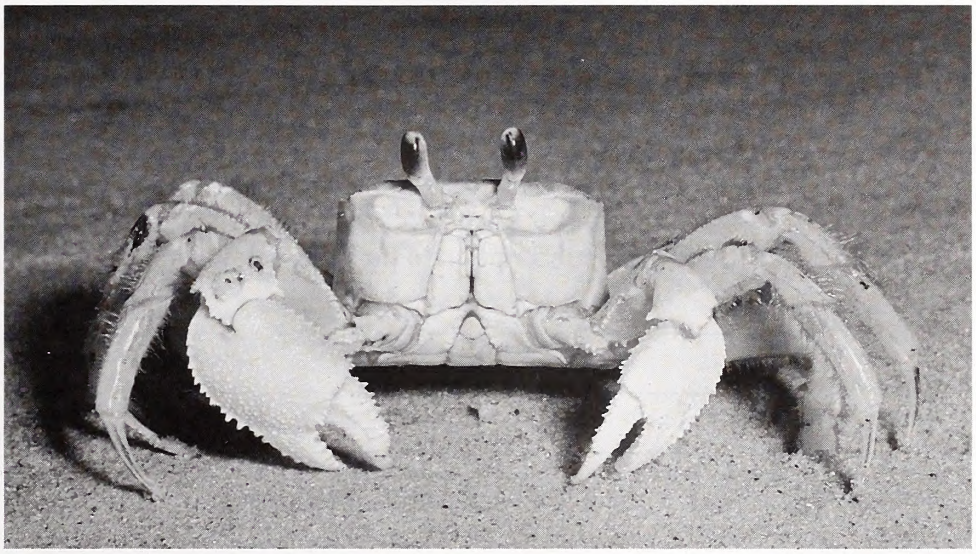

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CONTENTS

WILDLIFE IN NORTH CAROLINA

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July 1998 *Volume 62, Number 7*

FEATURES

4 **Hope for Currituck's Bass** *written by Rodney Foushee*
Fisheries biologists have been trying to jump start Currituck's stalled bass populations, but the fabled fishery may just be rebounding on its own.

8 **Common Ground** *written by Chris Powell*
photographed by Ken Taylor
Regional land trusts are playing a larger role in protecting North Carolina landscapes, and landowners are reaping the benefits.

14 **Song of the Seashell**
photographed by Melissa McGaw
What is more bewitching than a seashell on a summer beach?

20 **Sweet Spots for Summer Crappies**
written and photographed by Soc Clay ©1998
Hot weather doesn't mean you can't catch slab-sized crappies. Follow these techniques and you'll extend your season well into the summer.

24 **Floating Bubble with a Zap** *written by David Lee* ©1998
illustrated by David Williams
The poison-tipped tentacles of a Portuguese man-of-war hide a complex life form that deserves a closer look.

page 20

page 14

page 8

DEPARTMENTS

page 28

Our Natural Heritage *by Jim Dean* ©1998 ..... **inside cover**
Nature's Ways *by Mary Kay Clark* ©1998 2
N.C. WILD Notebook *by Consie Powell* ©1998 28
Back Porch *by Rodney Foushee* 32
Wildlife Through the Year *by Rodney Foushee* 36

Cover *The stilled waters of Currituck Sound in this photo from the 1960s once hid a lively bass fishery. Photograph by Jim Dean.* ©1998

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Bringing Up Baby... Upside Down

written by Mary Kay Clark ©1998
illustrated by David Williams

In the spring, when insects become more plentiful and predictable, bats become more active. They emerge from hibernation or migrate back north from wintering sites and the adult female bats devote much of the spring and summer to giving birth and raising young.

It's quite a chore. Bats are born naked and helpless and they emerge in the breech position, bottom first, to minimize the danger of getting wings entangled in the birth canal. Large wings would also be a problem during birth which explains why they are poorly developed in the newborn. However, the young bat's thumbs, hind feet and nails are well-developed, enabling the pup to climb to a teat and get a firm grasp on the mother. After birth, young bats are not carried for long by mothers because it would be hard to fly and successfully hunt with the extra weight of the young.

Pups left in the roost must be able to cling tightly to surfaces while the mother is out feeding. They literally hang on for dear life because if they fall they will most likely die.

Many small mammals have litters of seven or more babies one or more times a year, but most bats give birth to only one pup once a year. Though there are more than 900 species of bats worldwide, only eight are known to produce more than two babies per year. Pregnant female bats have to fly, feed, get in and out of roosts and dodge obstacles, and all of this takes place in the dark while carrying a heavy load. Is the bats' small litter size connected to these needs?

To answer this question, researchers compared bat embryo weights with those of similar-sized terrestrial mammals and found that the total weight of embryos at full-term did not differ between the two groups. Even though most bats carry only one large embryo, and many terrestrial mammals carry several smaller ones, the total embryo weight per female was about 25 percent of the adult mass in both groups. But that's not what accounts for the small litter size.

Clues can be found in the growth-and-development phase.

Young bats are dependent on their mothers for a longer period than the young of most mammals. They can't fly until their wings have reached the length and width of the adults' wings. It takes about a month for the wing bones to grow and harden enough to withstand the forces placed on them by flight. The lactating mother produces all of the calcium needed to produce the skeleton of a juvenile bat, and it takes a lot of energy to produce that milk. In fact, there is some evidence that bats of some species deplete their own calcium stores to meet the demands of their offspring.

Thus the main factor limiting the number of infants produced is the burden of rearing young to independence and of providing enough calcium to produce the skeleton of a flying juvenile.

By late July, most young bats look a lot like the adults. They have lost their milk teeth, have grown to adult size and have the same fur coloration as adults. Their wings are well-developed and the young are flying and feeding on their own. Biologists can still distinquish the young from adults by taking a close look at the finger joints in the wings. They are not yet completely fused.

In about six weeks, bat pups, usually born from late May through mid-June in North Carolina, have to reach adult size and learn much of what they need to know to survive for the rest of their lives. Why do young bats have to grow so fast? Most temperate species of bats are insectivorous and insects are not out and about in large numbers in the colder months, so dependable sources of food are only available for a short time.

Adult females are especially stressed. They must raise a healthy, independent offspring in a few short weeks and then get themselves healthy and fattened-up before winter arrives with its long fast and hibernation. In the spring, the reproductive cycle starts all over again.

Mary Kay Clark is the curator of mammals at the N.C. State Museum of Natural Sciences.

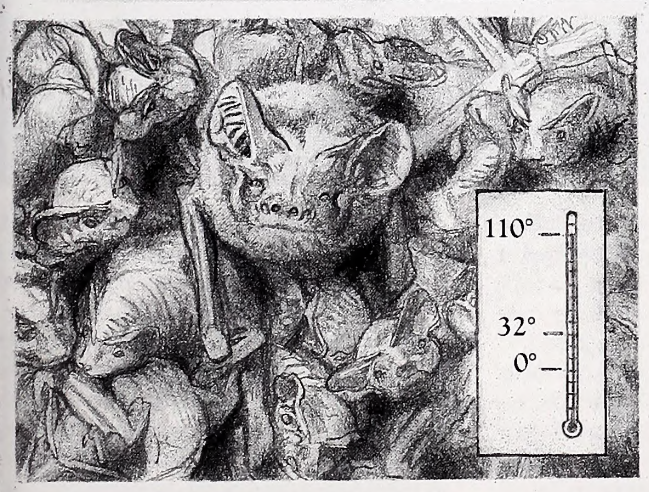
Other reading

- Frank Greenaway, Jerry Young, *Amazing Bats* (Eyewitness Juniors, No. 13, Alfred Knopf, 1991).
- Merlin D. Tuttle, *America's Neighborhood Bats* (University of Texas Press, 1988).
- Don E. Wilson, *Bats in Question: The Smithsonian Answer Book* (Smithsonian Institution Press, 1997).

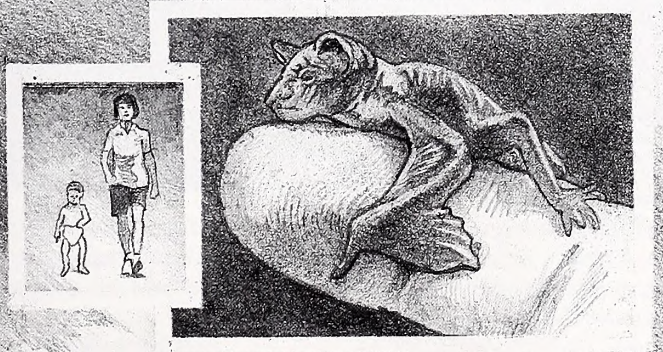
Surfing the Web

- The web site for Bat Conservation International contains concise information on programs, bat house construction, bats and rabies and links to other sites. Plus you can access articles published in their magazine *Bats*. *Address:* http://www.batcon.org
- An award-winning site, the Buzbee Bat House Temperature Plot features one of the most comprehensive list of linkages to other bat sites. *Address:* http://www.nyx.net/~jbuzbee/bat_house.html

The red bat, one of our most common species, *spends most of its life alone. It prefers to roost among tree foliage where it may be mistaken for a dead leaf or a small pine cone. The habit of roosting in a more exposed area makes red bats and their offspring more susceptible to environmental hazards and predation. A greater risk of loss due to extreme weather, predation or other factors may explain why red bats may have as many as four young while most species have only one.*

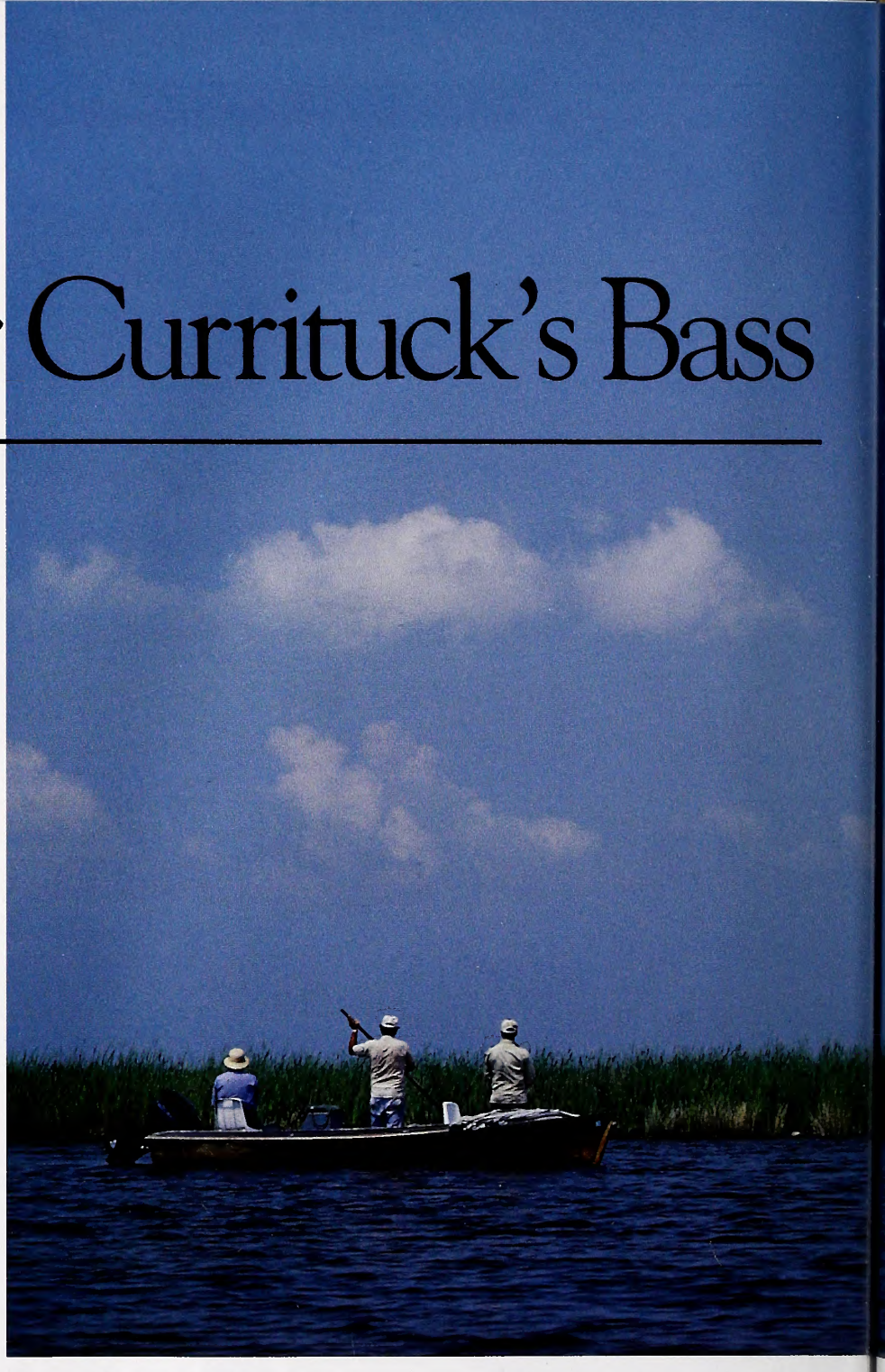


The females of many bat species *come together in the spring and form single species colonies where they give birth and raise their young. Young bats have a difficult time keeping warm; clustering together in a group helps. Females also choose nursery sites with temperatures as high as 110° F. This is why some species roost in hot attics.*



A newborn bat weighs *less than 2 grams, about the weight of two paper clips. Although it seems small, this is about 25 percent of the mother's weight. If a 100-pound woman were to have a baby as large as a bat, the baby would weigh 25 pounds!*

Hope for Currituck's Bass



Fisheries biologists have been trying to jump start Currituck's stalled bass populations, but the fabled fishery may just be rebounding on its own.

written by Rodney Foushee

Twenty years ago it was not uncommon to catch 100 largemouth bass from Currituck Sound during a single day of fishing. Today such feats are unheard of in the brackish sound located in northeastern North Carolina.

Though decent numbers of bass are again being taken from the upper reaches of the sound and its freshwater tributaries, gone are the large schools of bass that once made Currituck one of the best largemouth fishing spots in the world. The tremendous numbers of bass are not the only things missing from the sound—many of the anglers, guides and businesses the rich fishery once supported are gone as well.

A two-year study just completed by the N.C. Wildlife Resources Commission was aimed at finding a way to help the Currituck bass fishery rebound. But as biologists have found out the hard way, Currituck is not quick to give up her secrets.

Currituck Sound's legendary bass fishery collapsed in the 1980s after two decades of fabulous fishing and lengthy stringers of bass. The decline has been blamed on various factors including the disappearance of the sound's aquatic vegetation, increased turbidity, or cloudiness, of the water, and an increase in the salinity of the sound. More than likely, all of these factors contributed to ruin the delicate balance that existed during Currituck Sound's heyday, yet the salinity problem continues to draw the most attention from many fisheries biologists.

A Little Salt

Salt water is fine for blue crabs, croakers, spots and other marine species, but it isn't favorable to such freshwater species as largemouth bass and sunfish. A little salt is not all bad. In fact, at low levels, largemouth bass aren't affected by it at all. But as the salinity continues to rise, largemouth bass reproduction is hurt. When salinity in Currituck Sound during the spring is higher than 10 percent (about three parts per thousand), the survival of bass eggs and young is reduced. (Fresh water, as you might suspect, has a salinity of zero parts per thousand, while the salinity of pure seawater is 35 parts per thousand.)

Why would the salinity of the sound increase? Since Currituck Sound is not influenced by lunar tides—those driven by the moon's gravitational pull—most of the salty water that enters the sound is blown in from Albemarle Sound during extended periods of southern winds. These wind tides can stack water into the back of the sound, bringing the water level up more than 2 feet in a matter of hours and increasing the salinity to more than 30 percent. Because

JOEL ARRINGTON

During its heyday *two decades ago, Currituck Sound produced some of the world's best largemouth bass fishing. Catches of 100 fish per day were possible. The fishery collapsed in the 1980s with the increase of the sound's salinity —a problem that persists today.*

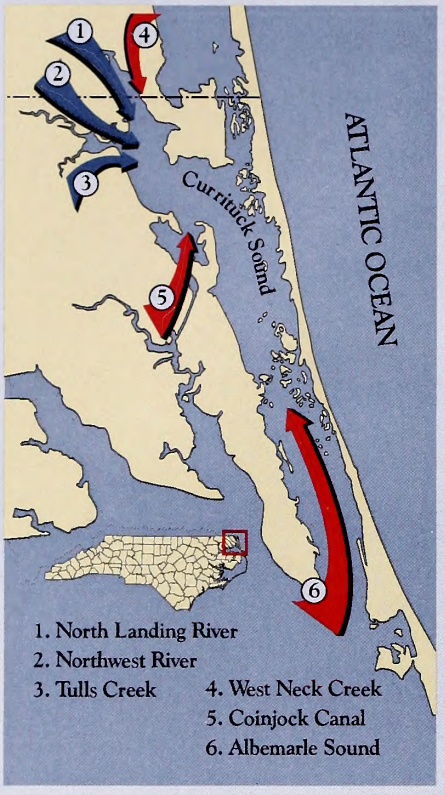
relatively few freshwater rivers or streams feed Currituck Sound, the major source of fresh water is rain.

When northeastern North Carolina experiences periods of drought and continuous southerly winds, the sound's salinity rises. Although the salinity in the southern portion of the sound nearest Albemarle Sound is usually the highest, drought conditions and other weather events can drive salinity up in the northern area as well.

Here's how it might happen: It's early May, and the adult bass in Currituck Sound are making nests and getting ready to spawn. The male sweeps out a nest with his tail, and waits for the female to lay the eggs. The salinity is two parts per thousand. Shortly after the eggs are deposited in the nest, a week of sustained south winds hits the area —the salinity increases to four parts per thousand. As a result most, if not all, of the eggs in the nest die. The same outcome occurs if newly hatched fry are subjected to high salinity. In fact, too much salt in the sound during the spring spawning season can wipe out all of the young largemouth bass. If this situation occurs in the same area for two to three years in a row, the result is a dramatic decline in the largemouth bass fishery in that part of the sound.

With Currituck Sound covering nearly 90,000 acres—about three times the size of Lake Norman, North Carolina's largest man-made lake—fisheries biologists quickly realized that stocking the entire sound was not practical. However, they thought that it

A Fragile Balance



Separated from the Atlantic Ocean by a thin ribbon of sand that makes up the northern Outer Banks, Currituck Sound has undergone a tumultuous past. Salinity levels in the sound have fluctuated widely in the past, and there is no reason to believe this won't continue.

Ancient Algonquin Indian sites along Currituck Sound are strewn with oyster shells, revealing that the sound was once much saltier than it is today. And early maps show several inlets linking Currituck Sound directly to the ocean. The last such inlet, Caffey's Inlet, closed around 1830. However, salinity levels in the sound continued to fluctuate with the development of canals and drainage ditches linking Currituck Sound with different bodies of water in North Carolina and Virginia. With its varied freshwater (blue arrows) and saltwater (red arrows) inputs from rivers, wind tides and natural and man-made connections to other large bodies of brackish and fresh water, Currituck Sound is one of the East Coast's most complex water systems.

Though salinity levels in the sound have dropped slightly in the past few years, one strong storm or hurricane could radically change the system. Some scientists speculate a new inlet to the Atlantic will eventually open on the Currituck Banks, again linking the sound directly to the sea. While this would transform Currituck Sound into a rich estuary for marine species, it would be the deathblow for Currituck's bass fishery.

RODNEY FOUSHEE

***Fisheries biologist** Chad Thomas prepares to release bass fingerlings injected with tiny metal tags into Currituck Sound. A two-year study by the Wildlife Commission proved that young bass can survive the sound's higher salinity levels, but the fish may not stay where they are released.*

was possible to improve bass populations in localized areas of the sound.

The reason for this hope was that young fingerling bass can tolerate salinity as high as nine parts per thousand, at least in the short run.

"The thinking was that we could skip the egg and fry stages and stock areas of Currituck Sound with bass fingerlings during high-salinity years," explained Chad Thomas, the Wildlife Commission's District 1 fisheries biologist. "This would help the natural bass population get over the hump of a poor reproductive year and might help restore adult populations in local areas."

Thomas and other Wildlife Commission biologists spent the last two years testing this hypothesis. They stocked fingerling bass in different areas of Currituck Sound and documented the results. About 12,000 largemouth bass fingerlings were stocked in four small coves in Currituck Sound beginning

in June 1996. Each of these fish was injected with a "microtag"—a tiny piece of metal barely visible to the eye. The magnetized tag was implanted in the bass's cheek. Once a month throughout the summer, biologists sampled each cove by charging the water with electricity, and then they collected all the largemouth bass they found. If a captured bass had been microtagged, the fish "beeped" when passed over a specially designed metal detector. During the study, microtagged largemouth bass were collected in areas where the salinity reached as high as six parts per thousand.

The study proved that fingerling bass can live at higher salinities in Currituck Sound. However, very few tagged fish were recovered during the study compared to the numbers released. The results were further compromised by the heavy rains over the past two years that kept the salinity of Currituck Sound very low—aiding natural bass reproduction.

"The problem for our research is that we stocked fish on top of two good years of natural reproduction and inadvertently created competition for the existing fingerlings," Thomas said. "The positive news is that we have proven stocked bass fingerlings can survive in 20 percent seawater in Currituck Sound. This would indicate that during high-salinity springs we might be able to come in and supplement local populations with stocked fingerlings."

But such a stocking effort would be daunting at best, Thomas admits. "There would only be a small window of opportunity to measure the salinity of the sound in the spring, capture adult bass, rear the fry and then put them back into the sound before the end of the summer," he said. Biologists would most likely have to raise Currituck bass fingerlings each spring and hold them in case of a salty year—an expensive and time-consuming proposition if the fingerlings were not needed, Thomas explained. And the study doesn't guarantee that the baby bass will remain where biologists put them. Many of the stocked fingerlings either left the coves where they were placed or were eaten by larger fish.

What seemed like a good idea may need more refinement. Like any good experiment, this trial-and-error method is the basis of solid science.

"We will continue to monitor the tagged bass," Thomas said. "But we will not conduct any more stockings in Currituck Sound until we can develop a good model that links salinity levels with bass reproduction."

No Quick Fix

Biologists are quick to point out that stocking alone is no panacea for Currituck Sound's ailing largemouth bass fishery.

"Too often, anglers and hunters think the answer to all our problems is stocking," explains Pete Kornegay, the Wildlife Commission's Coastal Fisheries Research coordinator. "In some cases where there is suitable habitat, stocking may be the answer. But the habitat must be there to begin with to support the new population."

Currituck's habitat has changed considerably over the past two decades. During the heyday of the fishery in the '60s and '70s, thick mats of Eurasian milfoil were common over much of the sound. No one is sure how this exotic plant got its start in the sound or what killed much of the beds during the late 1970s. But one thing is certain: The appearance of the milfoil coincided with the pinnacle of the famed Currituck bass fishery. The dense weed beds not only provided cover for lurking bass but also served as shelter for small prey species favored by largemouths and other predatory fish.

The milfoil also benefited wintering waterfowl by providing food and cover for small invertebrates eaten by ducks and geese.

"It's clear that the health of Currituck Sound is tied to this submerged aquatic vegetation," said Yates Barber, a retired fish and wildlife biologist who has studied the sound for more than 40 years. "At times it got pretty salty out there. This eliminated the bass and most of the vegetation. This vegetation is the key to the renowned waterfowl and great freshwater fishery that existed in Currituck Sound. With all of this food and cover gone, the total volume of bass is gone. This can't be corrected until we get the vegetation back."

That may be happening naturally in the northern and central reaches of Currituck Sound where native aquatic plants including widgeon grass, wild celery and redhead grass have rebounded in the past few years. The good news for Currituck Sound's bass population is that spring salinities throughout most of the sound have been less than three parts per thousand for the past three years. The result has been successful reproduction by native adult bass. With the return of the native vegetation and continued good reproduction, Currituck Sound's storied largemouth bass fishery may rebound on its own.

Though nothing about Currituck is certain, this year should provide some of the best bass angling the sound has offered in this decade. One hundred fish per angler? Don't count on it. But with some luck you should be able to catch your limit. ⊠

Wildlife Commission fisheries biologist Chad Thomas provided invaluable assistance in preparing this article.

JOEL ARRINGTON

***With the return of** native aquatic grasses, lower salinity and good natural largemouth reproduction in the past few years, Currituck Sound's bass fishery may just be recovering on its own. Though catches of 100 fish per day are still out of reach, this year the sound should offer some of the best bass angling of the decade.*

COMMON GROUND

Regional land trusts are playing a larger role in protecting North Carolina landscapes, and landowners are reaping the benefits.

written by Chris Powell
photographed by Ken Taylor

Tom Alexander saw the problem coming. Development had exploded in Haywood County during the past 20 years, and it was headed his way. Located adjacent to the Great Smoky Mountains National Park, his mostly undeveloped property was appreciating like an ore-bearing gold mine. "It was doubling in value about every three to four years," said the 67-year-old Maggie Valley resident. Usually, someone with valuable property would consider themself fortunate. Not Alexander. With his property estimated at $10 million, he saw little chance of willing it intact to his children because his estate would have to pay about $4 million in taxes. And that could only be done by selling off land that had been in his family for 60 years.

With a portion of the property seemingly destined for development, Alexander contacted the Southern Appalachian Highlands Conservancy. The Highlands Conservancy is a land trust—a mostly volunteer, nonprofit organization that protects special properties of conservation value. Alexander's 1,000 acres include the 222-acre Hemphill Bald. "One reason we considered Alexander's property significant was because it was a bald, which is becoming a rare ecosystem," said Lynn Cox, executive director of the Southern Appalachian Highlands Conservancy. "It certainly is recreationally significant because hikers can enjoy 360-degree views. But it is also a working farm. We wanted to do something to maintain the agrarian character that is part of Haywood County."

Using a legal agreement called a conservation easement, the conservancy was able to help Alexander by establishing that the land could never be subdivided. With future development permanently blocked, the bald's value dropped by about 78 percent. Now, Alexander said his family is considering additional easements on the remaining 800 acres to reduce the value of all of the land. But what has been lost in dollars will be more than made up for in personal value. "We have a strong sentimental attachment to the land, and we didn't want to see it sold off or go into the hands of developers," Alexander said.

The net result of the easements, once completed, will be a large natural area preserved in perpetuity. The Alexander family will receive additional fringe benefits in the form of lower estate, state and federal income taxes as well as reduced local property taxes. It is a win-win situation the Highlands Conservancy has made possible on numerous other occasions. To date, the conservancy has been able to protect 16,363 acres. These achievements include accepting easements on 103 acres that provide panoramic views of the Ox Creek Community and nearby Reems Creek, in Buncombe County. The group has also accepted a 601-acre easement on Little Sandy Mush Bald, the highest privately owned

***A cooperative effort** between the Southern Appalachian Highlands Conservancy and the owners of the Cataloochee Ranch, in Maggie Valley, resulted in the protection of Hemphill Bald. From left to right, are property owner Alice Aumen, Appalachian Conservancy Executive Director Lynn Cox, property owner Judy Coker and property owner Tom Alexander.*

elevation in Buncombe County.

At present, 19 land trusts are operating throughout North Carolina. Though each is unique to its own area, all land trusts have the goal of protecting "significant" land. That is not to say they oppose all development, just that which could threaten special pieces of property. "Land trusts are mostly volunteers, and have boards often comprised of community leaders and businessmen and take a non-adversarial, noncontroversial approach to acquiring land," said Chuck Roe, executive director of the Conservation Trust for North Carolina, a Raleigh-based organization which helps land trusts. These sought-after properties could include habitat for endangered species, historic locations, farmland, woodlands, scenic locales or, simply, open spaces in a metropolitan area.

The Southern Appalachian Highlands Conservancy, active since the 1960s, is the oldest organization of its kind in the state. However, the popularity of land trusts is a fairly recent phenomenon, with most originating in the last 10 years. "Our ideal is to have 12 to 15 really strong regional land trusts with some paid staff and good levels of support," Roe added, "and then, a smattering of more local, all-volunteer groups."

The sudden spark of land-trust interest is largely in response to a rate of growth never before experienced in North Carolina. Known for its agrarian heritage, the Tar Heel State is rapidly gaining a reputation as a leader in high-tech industry and job growth. Housing developments, strip malls, highway systems and factories are all dominant images typifying the state as it careens toward the new millenium. The obvious examples of this leap into the future are the larger cities. Still, small towns such as Kinston, home of the budding Global TransPark, are jockeying to be the next big thing. The hope is for growth, which equates to higher-paying jobs, nicer houses, better public facilities—in short, the American dream. But this growth has a price, and the bill is being paid in land.

The state's population during the past two decades has increased from 5 million to more than 7 million people, and it is projected to just miss 8 million by the year 2000, according to the N.C. Office of State Planning. Approximately 45,000 acres of farm/woodlands is developed each year in North Carolina, according to the Land Resources Division of the Department of Environment and Natural Resources. During 1997 alone, 73,404 permits were issued statewide for construction of residential units, according to the U.S. Census Bureau.

A case in point is Raleigh, which has been undergoing phenomenal growing pains since the early 1980s. The inflow of people is having a spillover effect, with family after family moving to the city's ever-expanding fringes. Tilled farmland one year is carved up into subdivisions the next. The mass migration into the country is also causing residual growth by forcing the construction of more schools, highways, police departments, hospitals and so on.

As available real estate dwindles, undeveloped property values increase proportionally. This, in turn, motivates landowners to sell either for profit or to avoid escalating property taxes. Even if property isn't sold, passing it intact to heirs is no sure bet. Estate and inheritance taxes can be higher than half the property's value, which often can be paid only by selling off parts or all of family land.

Special farmland and other unique properties in North Carolina would indeed be an endangered resource if it were not for the increasing efforts of land trusts. These regional trusts imitate the methods of The Nature Conservancy, an international conservation organization that seeks to protect vast ecosystems, which it often refers to as "best of the rest." The North Carolina chapter of the Nature Conservancy, founded in 1978, has helped protect 379,361 acres in this state. Included in that figure are such large properties as the Alligator River National

North Carolina's Land Trusts

Conservation Trust for North Carolina
P.O. Box 33333, Raleigh, N.C. 27636
Geographic area - statewide
Phone - (919) 828-4199
Year of establishment - 1991
Total acres protected - 18,046
Contact - Chuck Roe, executive director

Association for the Preservation of the Eno River Valley
(Eno River Association)
4419 Guess Road, Durham, N.C. 27712
Geographic area - Eno River watershed in Orange and Durham counties.
Phone - (919) 477-4549
Fax - (919) 477-0488
Year of establishment - 1975
Total protected acres - 53.25
Contact - Wayne Cash, president

Carolina Mountain Land Conservancy
P.O. Box 2822, Hendersonville, N.C. 28793
Geographic area - Henderson County, parts of Transylvania and Buncombe counties.
Phone - (828) 697-5777
Year of establishment - 1994
Total acres protected - 466
Contact - Sue Jennings, project coordinator

Catawba Lands Conservancy
1050 Morehead St., Charlotte, N.C. 28202
Geographic area - Catawba River basin, Catawba, Gaston, Lincoln, Mecklenburg and parts of Iredell and Union counties.
Phone - (704) 342-3330
Year of establishment - 1991
Total protected area - 711
Contact - Ron Altmann, executive director

Foothills Conservancy of North Carolina Inc.
P.O. Box 3023, Morganton, N.C. 28655
Geographic area - Foothills region including Alexander, Burke, Caldwell, Catawba, Cleveland, Lincoln, McDowell and Richmond counties.
Phone - (828) 437-9930
Year of establishment - 1994
Total acres protected - 17,829
Contact - Susie Hamrick Jones, executive director

High Country Conservancy
577-5 George Wilson Road, Boone, N.C. 28607
Geographic area - Watauga, Ashe and Avery counties.
Phone - (828) 264-2511
Year of establishment - 1995
Total acres protected - presently working on a 13-acre conservation easement
Contact - Michelle Merritt, president

Highlands Land Trust Inc.
P.O. Box 1703, Highlands, N.C. 28741
Geographic area - Highlands
Phone - (828) 526-3496
Year of establishment - 1987
Total acres protected - 280.95
Contact - Moyna Monroe, executive director

LandTrust for Central North Carolina
P.O. Box 4284, Salisbury, N.C. 28145
Geographic area - Yadkin/Pee Dee watersheds/ Anson, Cabarrus, Davie, Davidson, Iredell, Montgomery, Richmond, Rowan and Stanly counties.
Phone - (704) 647-0302
Year of establishment - 1995
Total acres protected - 2,071
Contact - Jeff Michael, executive director

Lumber River Conservancy
P.O. Drawer 1087, Lumberton, N.C. 28358
Geographic area - Lumber River corridor in Colombus, Hoke, Robeson and Scotland counties.

***Through a conservation** easement, the Conservation Trust for North Carolina protected the Grand View Overlook along the Blue Ridge Parkway. Owner Sterling Carroll (left) and Margaret Newbold, a Conservation Trust for North Carolina representative, look out on the overlook.*

Wildlife Refuge (110,000 acres in Dare, Tyrell and Hyde counties) and Panthertown Valley (6,295 acres in Jackson and Macon counties). In contrast, the younger regional land trusts work to protect smaller tracts of local importance. As of 1997, North Carolina trusts have been able to protect a total of about 56,000 acres.

These protection efforts can be accomplished in a variety of ways. Land trusts can accept donated conservation easements or purchase land using money acquired from grants and membership dues. Also, landowners can donate land or sell it for less than its market value, known as a "bargain sale." Land purchased outright is sometimes deeded to the N.C. Wildlife Resources Commission, the U.S. Fish and Wildlife Service or to another public agency for a park or game land.

At present, the Columbus-based Pacolet Area Conservancy is using the donation and bargain-sale methods to protect a side of Warrior Mountain, in Polk County. Fifty acres of the mountain are owned by the Polk County Community Foundation, which was originally given the land to raise money for community projects. However, instead of selling the land to developers, the private foundation gave the Pacolet Conservancy a two-year option on the property priced at a bargain value of $53,000. Norman Wilder, former president of the Pacolet Conservancy, said the property is an important acquisition because it is a watershed for the North Pacolet River and also adjoins 100 acres owned by The Nature Conservancy. "We are in the process of completing an arrangement by which The Nature Conservancy will transfer its 100 acres to us for administration. So when we are done, we will have 150 acres," Wilder said.

But outright ownership of the land is not always an option for land trusts. They can't always rely on public donations and

Phone - (910) 738-5257
Year of establishment - 1991
Total acres protected - 1,191
Contact - Dickson McLean Jr., assistant secretary treasurer

National Committee for the New River Inc.
P.O. Box 180, Glendale Springs, N.C. 28629
Geographic area - New River watershed in North Carolina, Virginia and West Virginia including Ashe and Alleghany counties.
Phone - (336) 982-9090
Year of establishment - 1974
Total acres protected - 229
Contact - Lisa Bare, office manager

Northeast New Hanover Conservancy
126 Beach Road South, Wilmington, N.C. 28405
Geographic area - 20 square miles between U.S. 17, the barrier islands and the Atlantic Ocean including the watersheds of three tidal creeks: Futch, Pages and Howe.
Phone - (910) 686-0362
Year of establishment - 1982
Total acres protected - 1,060
Contact - Paul Foster, president

North Carolina Coastal Land Trust
720 Market St., Wilmington, N.C. 28401
Geographic area - eastern North Carolina
Phone - (910) 763-0332
Year of establishment - 1992
Total acres protected - 5,673
Contact - Camilla Herlevich, executive director

North Carolina Rail-Trails Inc.
703 9th St., Drawer 124, Durham, N.C. 27715
Geographic area - rail corridors, statewide.
Phone - (919) 542-0022
Year of establishment - 1989
Total acres protected - 3,462
Contact - Al Capehart, executive director

Pacolet Area Conservancy
P.O. Box 310, Columbus, N.C. 28722
Geographic area - Transylvania, Henderson, Polk counties and adjoining parts of Greenville and Spartanburg counties in South Carolina.
Phone - (828) 894-3018
Year of establishment - 1989
Total acres protected - 2,695
Contact - Jo Ann Miksa, office manager

Piedmont Land Conservancy
P.O. Box 4025, Greensboro, N.C. 27404
Geographic area - Alamance, Caswell, Forsyth, Guilford, Randolph, Rockingham, Stokes, Surry and Yadkin counties.
Phone - (336) 691-0088
Year of establishment - 1990
Total acres protected - 500
Contact - Kathy Treanor, executive director

Sandhills Area Land Trust
P.O. Box 1032, Southern Pines, N.C. 28388
Geographic area - Sandhills counties of North Carolina.
Phone - (910) 695-4323
Year of establishment - 1991
Total acres protected - 200
Contact - Nell Allen, administrator

Smith Island Land Trust
P.O. Box 3203, Bald Head Island, N.C. 28461
Geographic area - Smith Island Complex including Bald Head Island.
Phone - (910) 457-6187
Year of establishment - 1996
Total acres protected-11
Contact - Nancy Maguire, president

Southern Appalachian Highlands Conservancy
34 Wall St., Suite 802, Asheville, N.C. 28801-2710
Geographic area - western North Carolina and eastern Tennessee
Phone - (828) 253-0095
Year of establishment - 1974
Total acres protected - 16,363
Contact - Lynn Cox, executive director

Triangle Land Conservancy
1100A Wake Forest Road,
Raleigh, N.C. 27604
Geographic area - Chatham, Durham, Johnston, Lee, Orange and Wake counties.
Phone - (919) 833-3662
Year of establishment - 1983
Total acres protected - 1,315
Contact - Kate Dixon, executive director

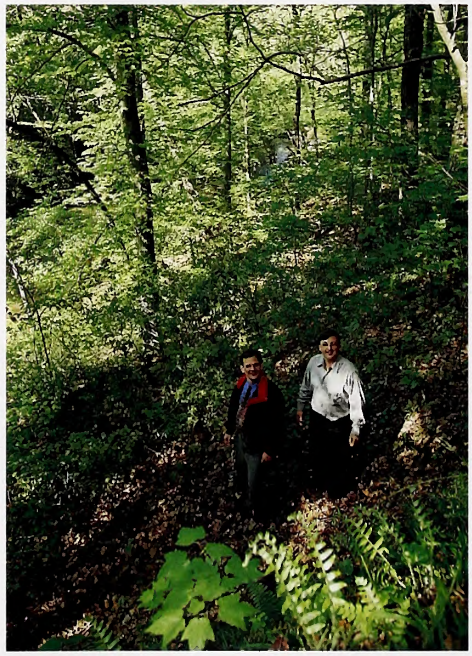
***At the Triangle Land** Conservancy's Swift Creek Bluff Preserve in Cary, left to right, are Kevin Brice, conservancy stewardship coordinator; volunteer site stewards Amy Klaenhammer; David, Jo Kathryn and Grayson Bland; and Kate Dixon, conservancy executive director.*

grant sources to fund their purchases. And even when land is bought, management of the property is an ongoing cost. Instead, Wilder said the Pacolet Conservancy prefers to protect property through conservation easements. "If we have an easement, it protects the environmental values, and the land stays with the landowner and he or she takes care of it," Wilder said.

A conservation easement is a legal covenant between the property owner and the land trust whereby the owner agrees to protect the significant natural value of his or her land. This means some of the property's uses are restricted permanently depending on the terms of the conservation easement. For example, an easement may allow a farm to remain in operation, but prohibit the land from ever being subdivided. The property affected by the easement remains under original ownership and can be sold or willed to heirs. However, the easement is permanently binding on the property, regardless of ownership. Once an easement is entered into, land trusts are required to make periodic inspections to ensure the agreement is being honored.

Why would a property owner voluntarily enter into such an agreement? Some do it because they love their land and want to maintain its scenic beauty. Others like easements because they reduce taxes and help keep the land in the family. For most, it is a combination of both.

Not to be confused with a legal loophole, conservation easements can be applied only to places of environmental or historical importance. These could include farms, woodlands, mountain slopes and river corridors—not back yards. Properties that qualify for conservation easements are typically found through natural heritage inventories sponsored by the N.C. Natural Heritage Program, which partners with land trusts and local governments to identify significant natural areas throughout the state. Projects are also brought to the attention of trusts by landowners concerned about their property's future.



***Cooperation** between the Catawba Lands Conservancy and Clariant Corp. will protect Long Creek Bluff, a haven for rare species in Mecklenburg County, in perpetuity. Shown at Long Creek are Mike Teague (left), director of safety and environmental affairs for Clariant, and Ron Altmann, director of the Catawba Lands Conservancy.*

The latter was the case with the Grand View Overlook, a 235-acre tract located near Boone on the Blue Ridge Parkway. Sterling Carroll, the 53-year-old owner of the tract, recently donated a conservation easement on the $470,000 piece of property to the Conservation Trust for North Carolina. The terms of the easement transferred all timbering rights to the land trust. But, Carroll is allowed to divide the property one time, and two houses can be built out of sight of the parkway. "It was right under the viewshed of that overlook," Carroll said, "and the topography of the land is pretty steep, and I didn't feel it was conducive for subdividing. So, I made the donation. I wanted to do something like that, and there were some tax advantages too."

The preservation of Carroll's property is one piece of a larger project to protect land along the Blue Ridge Parkway corridor. If the parkway's traditional aesthetics aren't retained, Chuck Roe believes North Carolina will lose not only a state treasure, but billions of tourism dollars. "In the parkway situation, you have historically rural lands, pastoral landscapes and forest land that are being incrementally replaced by subdivisions and commercial development," Roe said. "So, you have a threat of killing that golden goose that has brought in 10 million tourists a year and $2 billion to the local economy."

From the mountains to the coast, land trusts are dedicated to the preservation of important properties. Though all the trusts are special, the following three have been chosen to illustrate the ground being gained and some of the methods being used.

Catawba Lands Conservancy

Not all conservation easements involve individual, private landowners. The Catawba Lands Conservancy, located in Charlotte, recently completed a deal with Clariant Corp. to protect a parcel of land the company owns called Long Creek Bluff. The bluff is a 16-acre, north-facing slope bordering a portion of Long Creek in Mecklenburg County.

The site became a priority for preservation after Jim Matthews, a self-employed biologist, evaluated the location for Mecklenburg's Natural Inventory Program. The steep relief of the bluff is ideal habitat for species found nowhere else in Mecklenburg County. "North-facing bluffs are the coolest and the wettest places in our area," said Matthews. "It was the shrubs and herbs that were of importance. Mountain laurel occurs on this site, beaked hazelnut; and then for the herb list, there is goat's-beard and real wild ginger."

Though the bluff would be difficult to develop, Clariant Corp. decided to eliminate

MELISSA McGAW

***The North Carolina** Coastal Land Trust aims at protecting properties along river corridors in the eastern part of the state. Coastal Land Trust representatives pictured from left to right are Executive Director Camilla Herlevich, Program Coordinator Lilia Ryan and Land Protection Director Janice Allen. Catherine Sloan (back right) recently donated a conservation easement on land she owns in Sampson County.*

all potential threat by donating an easement anyway. "Basically, the easement states that we won't compromise the area or interfere with its natural state as it exists right now," said Chris Barnard, Clariant's vice president and general counsel.

The Catawba Lands Conservancy serves the lower Catawba River basin as well as Gaston, Lincoln, Mecklenburg and Catawba counties, including parts of Iredell, Union and York counties. Established in 1991, the conservancy has protected about 711 acres. Most notable of these successes is a 535-acre easement donation on the South Fork River in Gaston County.

The Catawba Conservancy is currently working in conjunction with Gaston and Lincoln counties to protect a 1,300-acre project along Mountain Island Lake. "The Trust for Public Land actually obtained a $6.5 million option to purchase this property," said Ron Altmann, director of the Catawba Lands Conservancy. "The Clean Water Management Trust Fund has recently approved funding for the property and the land will be deeded to the counties. Our role would be in accepting conservation easements and making sure the land would not be developed in the future."

Triangle Land Conservancy

The Triangle Land Conservancy, established in 1983, is active in Chatham, Durham, Johnston, Lee, Orange and Wake counties. Among its protection successes is a 258-acre tract of relict white pines found at the confluence of the Rocky and Deep rivers in Chatham County. So far, the group has protected 27 properties totaling more than 1,300 acres.

Having originally targeted separate pieces of land, the Triangle Conservancy has shifted its focus to larger tracts that can be connected. "We started wondering, are these smaller tracts viable preserves?" said Kate Dixon, executive director of the Triangle Conservancy. "Now, instead of saying , 'Let's protect these five acres where the plants are,' we say 'Let's think about this whole landscape and what we need to protect.'"

A good example of the group's new focus is its New Hope Creek project. The Clean Water Management Trust Fund recently awarded the Triangle Conservancy a $2.75 million grant to purchase 400 acres of land along New Hope Creek in Orange County. The largest tract to be acquired contains seeps and bogs that are rich habitats for many wildlife species. "So much of the land along the creek is already protected by the U.S. Army Corps of Engineers for Jordan Lake and Duke University Forest," Dixon said. "We figured if we could acquire significant stretches of private land between these areas, we could do some significant protection."

Because of the Triangle's growth, the conservancy is also very concerned about the preservation of open space. "We have decided we want to be more active in advocacy for open land in the Triangle," Dixon said. "We'd like to work with local governments in a nonadversarial way and with public groups and other nonprofit organizations trying to raise issues of open space protection and ways to make it happen."

North Carolina Coastal Land Trust

The North Carolina Coastal Land Trust, based in Wilmington, was established in 1992 and serves most of the state's coastal region. So far, the trust has been able to protect about 5,673 acres. One of its crowning achievements has been the acceptance of a conservation easement from Weyerhaeuser Corp. on the Mill Pond and riparian wetlands tract along the Newport River, near Morehead City.

Most recently, the trust has secured conservation easements for a mile-long river corridor along the South River in Sampson County. The easements were donated separately by Catherine Sloan, of Sampson County, and Dougald Clark Jr., of Fayetteville. "It is a tributary of the Black River," said Camilla Herlevich, executive director of the N.C. Coastal Land Trust. "It is a wonderful cypress, gum forest and is a great wildlife corridor."

One of the easements was for a portion of the David Dickson Sloan Farm, which is listed on the National Register of Historic Places. Catherine Sloan, 72, said she donated the easement to keep the property undisturbed and in her family. "This 41-acre tract has been in my family since the 18th century," Sloan said. "I think the beauty of it is a benefit to everybody who passes by. And although my family will inherit it, I wanted to make sure my own wishes were truly accorded in perpetuity." Sloan has also donated a 4-acre island in Bladen County. Farther downstream where the Black River flows into the Cape Fear River, Dupont Corp. has donated more than 400 acres that include longleaf pine uplands and riparian wetlands.

Future Coastal Land Trust projects will likely continue to center on the Neuse River because of water quality issues. "What we hope to do is acquire more conservation easements on private land," Herlevich said. "And we also hope to find some areas that can be restored where we can actually partner with local governments to contribute to the improvement of water quality."

For good or bad, the development of forests and farmland will continue throughout the state. The question is: can North Carolinians manage this growth in a way that protects natural habitats and scenic locations? The answer, so far, is yes. Through cooperative efforts, land trusts and property owners are meeting this challenge and, in more ways than one, finding common ground. ☒

SONG OF THE SEASHELL

What is more bewitching than a seashell on a summer beach?

photographed by Melissa McGaw

As common as seashells are, we treat them like objects too precious to leave behind. We spend hours on the beach bending at the waist to pick them up, stuffing them in sacks and then lugging the loot home with us. Some of the shells even make it to our shelves, to the tops of dressers, to our office desks where they haunt us with their bright colors, with the memories they bring of surfcrash and birdcall.

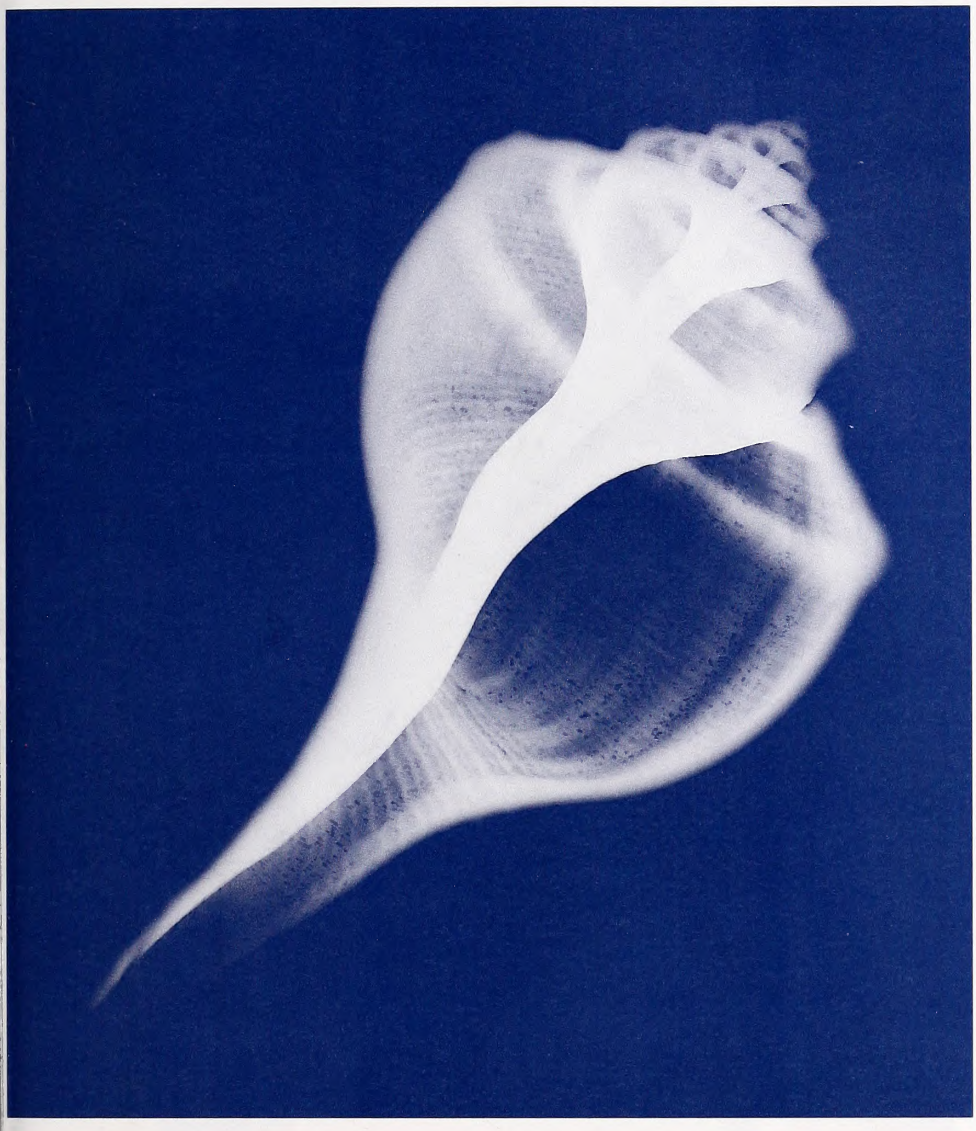
We know they are the calcified remnants of once living animals—mollusks. We know ponderous forces over immense amounts of time ground up billions of these mollusk remains to help form North Carolina's sandy beaches. Yet we can be forgiven if we neglect the animal itself to admire their shells' stylish colors and shapes.

Mollusks fall into two main classes—bivalves and gastropods, or clams and snails. But within these two groups is a variety so lavish that it reminds us once again of nature's endless diversity. You can find such extravagance repeated in every ecosystem, but nowhere as colorfully or with such lyric invention as in the world of the seashell.

bivalves:

Scallops are a common *(and tasty) bivalve. These lion's paw scallops range in size from the large to the very small, and their colors and textures vary as well.*

lion's paw scallops



The bivalve shell is *simplicity itself—there's a top and a bottom. In contrast, the gastropod offers a singular and beautiful spiral geometry that has inspired poets and mathematicians alike. In the X-rays of this channeled whelk and baby's ear, you can see how the gastropod's complex line curves round and round, suggesting the infinity of space itself.*

channeled whelk & baby's ear x-rays

gastropods:

Their names are *inventive and even playful—tulips, olives, cowries and bonnets. But they're all snails—or at least the remains of them. With the shells turned so that their operculums (or body openings) are hidden, their swelling architecture is fully displayed. Contemporary architects have used this elegant construction in their buildings.*

thick-lip drill

shark eye

banded tulip

tinted cantherus

lettered olive x-ray

lettered olive

Kiener's whelk

sculptured topsnail

Clench helmet

Eastern auger

Eastern auger x-ray

channeled whelk

Sozon cone

brown baby ear

Atlantic cowrie

common nutmeg

Scotch bonnet

why a sand dollar is **not** a seashell

Many of us assume that if a shell is found on the beach it's a seashell. And in most cases, that's true. As members of the phylum Mollusca, *the calcified remains of snails, clams and mussels are true seashells because they come from mollusks. But other shells are not. Barnacles are not mollusks but actually marine crustaceans that live cemented to a hard object such as a clam shell, a piece of driftwood or the back of a whale.*

And the sand dollar, though it looks like a seashell with its hard outer covering, belongs to the phylum Echinodermata, *which includes the sea urchin, sea cucumber and starfish. The surfaces of both the upper and lower shells of the live sand dollar are covered with spines that help it move and eat. The five slits in the shell are actually grooves through which the spines pass food. Echinoderms are distinguished from the mollusks by their five-part radial symmetry—that is, the body is arranged in five equal parts around a central axis.*

—Arthur E. Bogan, curator of aquatic invertebrates, N.C. State Museum of Natural Sciences

tuskshell

Florida wormsnail

Atlantic jackknife

Florida spiny jewelbox

angel wing

small treasures:

Angel wing, jewelbox, *jackknife—we pick these up with more questions than answers. They don't look exactly like clams or snails, but they're bivalves and gastropods just the same—all except the tuskshell, which is a scaphopod, a separate class of mollusk. Mollusks have a multitude of body plans. Celebrate the diversity!*

X-rays provided by the N.C. State University College of Veterinary Medicine. Shells from private collections and the N.C. Museum of Natural Sciences.

lace murex

common Atlantic slippersnail

Atlantic distortio

turkey wing

spiny slippersnail

spotted slippersnail

variable coquina

blue mussel

The thermometer on the wall of the marina read a blazing 96 degrees in the shade! "Too hot to go fishin'," a dockhand sitting on the edge of the pier grumbled to no one in particular. To keep cool, he was dangling his bare feet in the lake while waving at his face with a cardboard fan.

I decided to go fishing anyway. In the more than 40 years that I've been fishing seriously, I've found that blistering sunlight, high humidity and no breeze deter more fishermen than fish. Considering that all fish have to feed—even in hot weather—I have always believed that if you go out enough and learn the lake, eventually you will find active, feeding fish.

The day reminded me of the time I was introduced to summer crappie fishing in the mid-1980s by the late Bob Ross, who owned a cabin on the banks of Fontana Lake and who had been a longtime acquaintance. I'd fished with him on a dozen occasions on Fontana and as far away as Buggs Island Lake. But we'd always gone fishing during the spring spawning period. I knew that he fished almost every day of the year, but I had no idea how proficient he was at catching heat-wave crappies until one hot summer day.

After chasing trout on Hazel Creek for several days, I decided on a change of pace and dropped by Bob's place to ask him what other fishing opportunities were close by. He suggested we spend a couple of days fishing for crappies on Lake Norman, a place where he'd had some success during past summers. I was frankly skeptical. For several days, near 100-degree temperatures had been frying the landscape and had all but shut down

Sweet Spots for Summer Crappies

Hot weather doesn't mean you can't catch slab-sized crappies. Follow these techniques and you'll extend your season well into the summer.

written and photographed by Soc Clay ©1998

***Fishing live minnows** along submerged structure is a popular method of catching heat-wave crappies. Because the fish are notoriously light biters, some anglers use bright-colored line to detect even the slightest nibble.*

daytime fishing activities.

I asked Bob if he was concerned about the steamy weather conditions. "Crappies will always bite if you can find them," he responded, as we motored up the lake to a spot he wanted to try.

Our first target was a brush mat located in 12 feet of water near the edge of a submerged creek channel. Fishing with a 9-foot fiberglass fly rod, Bob used live bait for taking crappie during the heat of summer. "A minnow the size of a man's little finger is just right for summer crappie fishing," he explained, baiting up a No. 4 Aberdeen hook tied directly to the end of bright yellow, 6-pound-test monofilament line. He mentioned that high-visibility line lets anglers see the slight line movement that is often the only indication a crappie has the bait in its mouth during dog days. The color of the line has little or no effect on white crappie, in particular, because they are sensitive to light and will almost always be found below the point of light penetration in the water.

Bob's rig included a light wire hook tied to the end of monofilament with a ¾ ounce-size barrel sinker pegged to the line 10 inches above the hook. The heavy sinker, he said, allowed him to probe the bottom to find wooden cover quickly. It also acted as a hook "de-snagger." He demonstrated this later when

the hook became entangled in the limbs of the brush mat below. By simply dropping the end of the rod sharply, the fast-falling weight easily pulled the hook free of the snag. Bob said that when using this setup, he lost no more than a dozen hooks a year. Before we stopped fishing that day, and after a dozen nice slabs had been placed on the stringer, I would also learn that the larger sinker doesn't scare the fish all that much, either.

Like all the good crappie fishermen I have talked with over the years, Bob said the key to finding summer crappies in North Carolina lakes is locating the edge of a creek or river channel and then finding some sort of wooden or weedy cover near the break. Crappies use submerged creek channels in reservoirs as highways to get back and forth. The wooden or weedy cover serves as "motels" along the way.

To make sure he had a number of underwater structures to fish, Bob worked many hours during the year to install hidden fish-attractors (like old Christmas trees and brush) on the edges of channel drops and along the side of steep bends in the creeks in water between 10 and 30 feet deep. Bob explained that there is little sense in building a shallow fish-attractor, because crappies will use it only a couple of months each year.

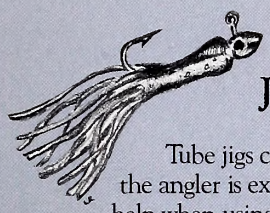
The veteran crappie angler's advice for fishing summer crappies in unfamiliar lakes was the same as he'd been practicing for many years: Obtain a good fishing or topographical map of the lake and locate the creek or river channels in the area to be fished. Depending on water clarity, he said, crappies will be found near wooden or weedy cover along the edge of big creek or main river channel edges in water ranging from 10 feet in murky water to as deep as 40 feet in super clear lakes and reservoirs like Fontana.

An exception to the creek and river channel edge rule, however, is a large lay-down tree that reaches from the bank into water 20 or more feet deep. If the tree has been in the water for more than a year, crappies will usually be holding on some portion of the trunk or larger limbs throughout the summer months. Bob always began fishing the deep end of the tree first by using his heavy sinker rig to find the trunk or limbs. If crappies are there, it doesn't take long for one to bite a live minnow. However, if nothing happens after three or four minutes, he advised the angler to work the bait slowly along the trunk up to about 7 feet of water to see if the fish can be located.

Bob believed that summer crappies will remain in deep water during the heat of the day, then move into more shallow cover late in the afternoon. Over the years, I've used Bob's sage advice to extend my crappie season well into the summer, and I've gained a lot of confidence in fishing the summer season. I've learned that in some instances crappies can be more predictable during the hotter months than during the spring spawn. In large reservoirs such as Gaston and Kerr, crappies often stack up near the lip of the old river channels in summer, seeking out stump fields and other woody cover near the breaking point between old fields and the primary and secondary river channel drops. I can catch these fish with some consistency if the wind allows me to keep the boat positioned above the break. In the past two years, I've been able to control the boat better with the aid of a trolling motor that automatically keeps a boat over a set depth at all times.

The heat of summer eliminates many of the places that crappies are found during spring and late autumn when the fish may be in 2 to 3 feet of water in the morning and at depths of 15 to 20 feet a few hours later. During the summer, crappies consistently show up on the lip of old creek or river channels to feed. To catch them, I locate the edge of the main river channel in water that ranges from 15 to 25 feet deep just before it drops steeply into 40- to 60-foot depths. The very best place to catch crappies is where the water depth is 15 feet on the top edge of the channel with a row of stumps or sunken logs located just over the lip of the channel drop at depths of 20 to 25 feet. During the course of the day, crappies will either be at the 15-foot level on top of the channel edge or

***Summer crappies will** generally remain in deep water during the heat of the day, then move into more shallow cover late in the afternoon. Submerged structure like trees or pier pilings often hold slabs in large numbers.*



Jigs Are Effective for Summer Slabs

Tube jigs can be just as effective as live bait for summertime crappies, if the angler is experienced in fishing these lures. These general rules may help when using artificial lures for summer crappies:

(1) Select a jig that is no longer than 1½ inches and has contrasting colors such as green-and-white, red-and-white and so forth. It is a good idea to have several color combinations because color can definitely make a difference when fishing jigs for crappies.

(2) Tie the jig to the line so that the body of the lure rides level in the water. This is accomplished by slipping the knot backward or forward on the hook eyelet until the lure hangs level on the line.

(3) Jigs should be fished with no more action than a slight movement of the hand or the movement of the boat caused by wave action.

between 20 to 25 feet down the side. It's a good idea to check both spots frequently to see if active fish are positioned there.

The principal reason the main river channel is more productive than secondary creeks is the general straightness of the bank, which makes it much easier to follow for long distances. With the aid of a depth-finding trolling motor, LCD (liquid crystal display) or graph, it is easy to locate stumps and other bottom cover along the edge. However, I still resort to an old trick I learned before I ever heard of a depth finder.

I tie a ½- to 1-ounce sinker on the line. Then I attach one 6- to 8-inch drop leader 1 foot above the sinker and a similar-size leader 3 feet above. I then tie number 4 hooks to the leader ends and bait up with live minnows. I use this system, called a two-hook river rig, to drag the bottom, hoping the sinker and not the hooks will get hung up in some kind of structure. Once the cover is located, I raise the rig about 2 feet and begin to move the boat slowly along the channel break. Moving the bait slowly is more effective for summer crappies, I believe, than letting it sit in one place.

I'll also stray from Bob's advice of choosing a minnow the size of my little finger, opting for bait that size and bigger when using the two-hook river rig. I rig up with one size on the bottom hook and a different size on the top. The one that receives the most attention in the first hour of fishing is the size I use the rest of the day for both hooks.

Severe changes in weather patterns are not as important for summer crappies as they are during spring and late fall. A severe frontal passage may move the fish a few feet up or down the banks, but they won't go far. During or immediately after a front, I'll start out shallow and move gradually deeper until I find active fish.

In highland reservoirs where the banks drop sharply into deep water, crappies will remain in the creek arms year-round. My old pal Bob, who loved to fish for crappies in highland lakes, said they often school according to size during summer months and move about the lake arms, searching for concentrations of shad and other bait fish. He said traditional places to find summer crappies in deep lakes are around any brush or other woody cover submerged on a mud bottom in hollows or in a narrow creek channel where cover is located on the edge of a drop.

For reasons only the fish know, large numbers of crappies will sometimes suspend in 15 to 25 feet of water in a layer across the breadth of the creek arm. These fish are easily detected with depth finders, and it takes only a few minutes fishing a live minnow to see if they are crappies and, if so, how big the fish are. If the first couple of fish caught from the school are small, it's best to move on because summer crappies are usually the same size throughout the school.

Summer crappie fishing is difficult because the fish tend to become much more finicky when the water and weather are hot. When conditions warrant, I'll scale back to 1-inch minnows and a number 6 or 8 light wire hook with a split shot pinched a foot above 4-pound-test line. Extra-sensitive tackle is needed to feel the extremely light bite sometimes indicated by no more than a slight line tic or movement to one side or the other.

The best time to start crappie fishing may be when everyone else is calling it quits. And if an overheated dockhand ever questions your sanity, be sure he notices your full stringer of crappies when you return. ☒

Crappies tend to school *according to size. By locating a few large fish, an angler can fill up a stringer of similar-sized slabs. One of the best places to catch crappies is in 15 feet of water with submerged cover located just over the lip of a channel drop.*

Floating Bubble with a Zap!

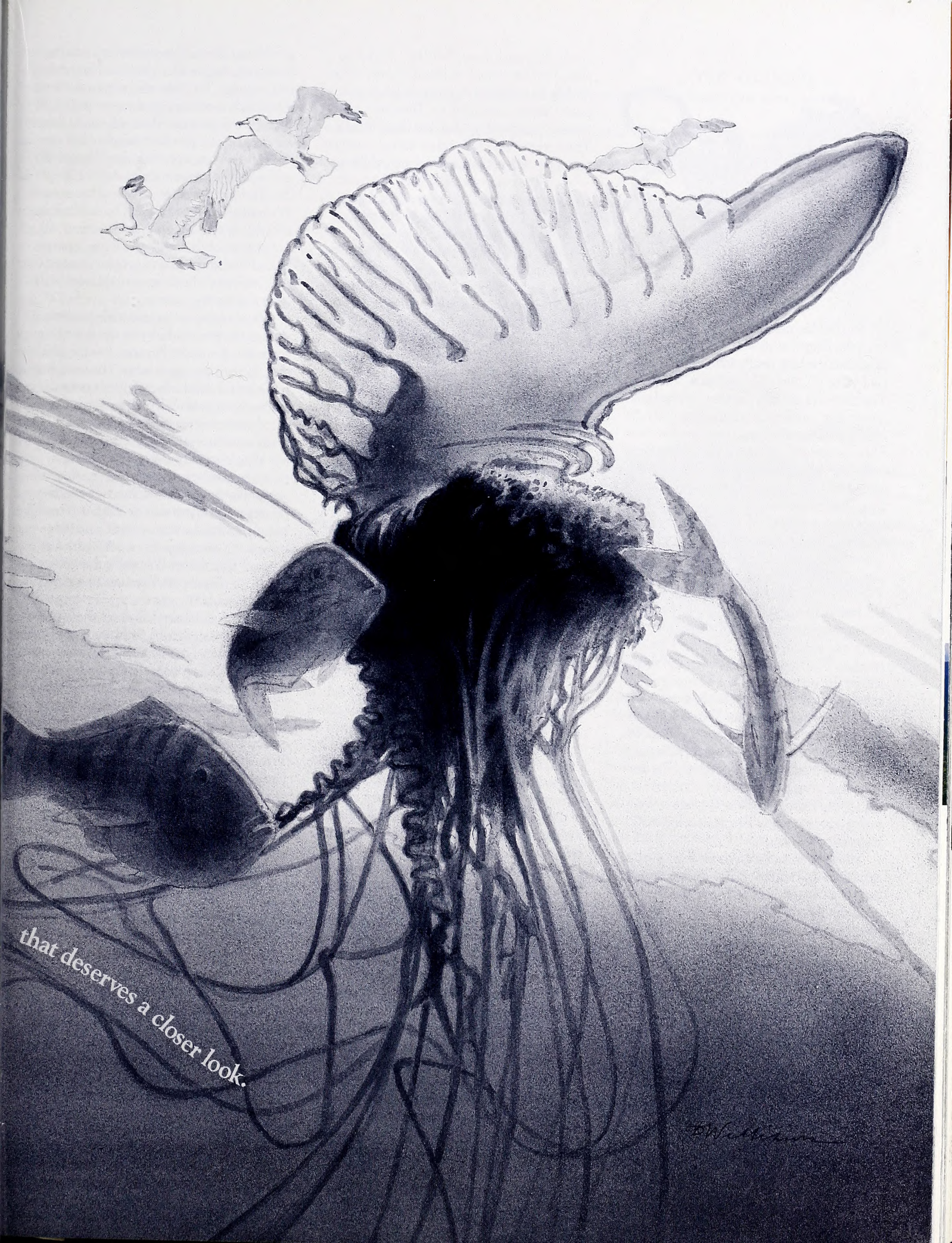
With their delicate neon purple floats, they look almost pretty bobbing on the surface of the open sea. Yet fiery tentacles 10 fathoms long give *Physalia pelagica*—popularly known as the Portuguese man-of-war—a dreaded reputation.

The name "man-of-war" at first seems a humorous spoof on Portuguese frigates, but the creatures' stinging tentacles pack quite a wallop, and I suspect that whoever came up with the name did so out of respect for both the animal and the warships. In Portugal they are called "*caravella*," a name derived from their supposed likeness to the Portuguese fighting ships. Several seabirds were also named for the fast frigate ships of the 16th and 17th centuries—frigate birds (also known as man-of-war birds) and frigate petrels—suggesting such comparisons were both common and that sailors were good observers. All share the wind as their primary means of transport; in fact the frigate birds, which can neither walk nor swim, are completely dependent on sea winds.

The man-of-war's reputation for giving a nasty sting with its tentacles is as widespread as is the beast. It is found in all tropical and subtropical seas. Currents, including the Gulf Stream, occasionally transport them far to the north. A microscopic view of the tentacles shows a near-solid field of tube-stuffed capsules. These are the nematocysts. Corals and anemones have them, too, but they are not powerful enough to penetrate human skin. But the man-of-war's nematocysts have trigger-like bristles that project from their surface. Within each nematocyst is a long, neatly coiled, spring-like tube equipped with a hypodermic dart. The armed tubes fire when the trigger is disturbed and become embedded in whatever they touch, injecting trace amounts of poison upon contact. The man-of-war uses the poison both to paralyze prey and as a defense. The relatively large size of the capsules and the length of the threads (several hundred times longer than the capsule) is what makes *Physalia* so potent. Unsuspecting medical researchers found that a discharged cyst can even penetrate surgical gloves. As painful as these stings are, human fatalities from these creatures have not been verified. Nevertheless, men-of-war have developed quite a nasty reputation.

The poison-tipped tentacles of a Portuguese man-of-war hide a complex life form

written by David Lee ©1998 / illustrated by David Williams ©1998


that deserves a closer look.

Nematocyst

The hidden danger of *Physalia* comes from the length of its tentacles. When fully extended they are nearly invisible and may trail 40 to 60, even 80 feet below the float. The tentacles are in a continuous rhythmic movement, alternately contracting and relaxing, constantly sampling the water for prey. Thus, swimmers seeing the distinctive floats may stay well away only to discover the currents carry the tentacles into their arms and legs. Contact causes the tentacles to contract, bringing many stinging cells to a relatively small area. These can be formidable. It has been estimated that about 750,000 nematocysts occur on every tentacle. The fiery pain and elongate welts left by a man-of-war sting are distinctive and unforgettable. The sting is as painful as any caused by wasps or hornets. The venom comes from the fluid within the nematocysts. It is a histamine-like substance and causes welts, redness and painful burning sensations. Though the exact composition of the venom is poorly known, there is evidence that at least three separate toxins are involved. One paralyzes the nervous system, one retards respiration and one causes the pain. The welts last one to four hours; the pain usually persists from 30 minutes to two hours.

I have been stung on more than a few occasions and while the stings were fierce, like most poisonous things, the man-of war does not live up to its dreaded reputation. In fact, as long as one is aware of the direction and potential length of the tentacles it is not that difficult to swim among them without getting zapped.

The key, of course, is to keep a safe distance even when the beasts are dead. As a youngster I recall popping men-of-war washed up on shore and my friends and I playing catch with them until someone got stung. We kept rediscovering that the cysts remained well charged long after the man-of-war had expired.

The cold facts of scientific journals and textbooks might relay much information about the man-of-war, but they do not do justice to the animal. A detailed description of *Physalia* is difficult because they lack named parts that we can relate to. They are coelenterates, watery bags that lack backbones. Their relatives include other vaguely familiar animals—sea nettles, anemones and hydras—as well as corals, sea fans and other colonial invertebrates. Taxonomically, they are in a class by themselves, but in appearance *Physalia* resemble jellyfish.

What is most interesting about the man-of-war, perhaps, is that it is not a single individual, but a colony. It differs from other colonial forms in that it is free living and the colony is formed by many hundreds of different styles of cells. Technically each group is a separate individual animal. Instinctively arranged and programmed, yet totally without the capacity of even a rudiment of thought, the different parts specialize in defense, flotation, reproduction and in catching and ingesting food. Unlike a single coral polyp, which in theory can live on its own, *Physalia* live only collectively. The groups form a large colony. The various colonists function as tissues, and the dividing line between a colony of different cell types and an individual animal composed of a variety of tissue types is very thin if not invisible.

Violet snail

Thin, too, is the appetizing nature of a marine organism equipped with an armament of explosive stinging cells. But plenty of creatures from loggerhead sea turtles to sea snails readily feed on these stinging masses of cells.

It was once believed that loggerheads had immunity to the man-of-war stings from antibodies in their blood, but this is not the case, and it is still not clear how the turtles can stand to eat them. They are clearly affected by the nematocyst's toxins—after eating *Physalia* their eyes and facial tissues swell. The scales and shell partly protect the exterior, but what of the tongue and esophagus?

Remarkably, marine snails also prey on the man-of-war. The violet snails, *Janthia*, like their prey, are ocean-going. Their delicate-lavender colored shells are lightweight. The graceful mollusks have evolved to ride the sea winds, fastened to a bubble float of their own making. The float also serves as a nest into which their eggs, or, for one species, live young are deposited. Their self-made floats are critical, not just for transport but survival. If they are ever dislodged they sink, and, unable to return to the surface, they die. The largest species is 1 ½ inches across its rounded, whorled shell. The smallest are about half that size. When disturbed, all five species of this genus discharge a purple fluid. After storms many people have seen their stains on the wave-washed sand without knowing the source.

These snails are hunters that passively stalk their prey on the same winds and currents that transport *Physalia*. It is inevitable that the two creatures meet. The snail simply crawls from the bubble float onto the man-of-war and with its numerous elongated teeth begins to dine. The attack is unceremonious and not particularly different than a snail or a slug consuming a prized houseplant. After eating the man-of war nematocysts and all, the violet snail repairs its float and sails onward. It is really not clear why the man-of-war's nematocysts don't discharge but researchers suspect that the snail's purple dye acts as a narcotic and deadens the sensitivity of the cysts.

Though difficult to find off the North Carolina coast, flotillas of violet snails covering more than 200 nautical miles have been reported. Collectively, they must have quite an impact on regulating *Physalia* populations.

Another remarkable predator on the man-of-war is *Nomeus gronorii*, more appropriately named the man-of-war fish. Writer Ernest Hemingway knew of them, as does almost any one who has spent any time in tropical seas. Almost every man-of-war of reasonable size has half a dozen or more small *Nomeus* swimming among its tentacles. The man-of-war's tentacles are the exclusive home of the young of these fish. *Nomeus* are members of a small family called

Sea slug

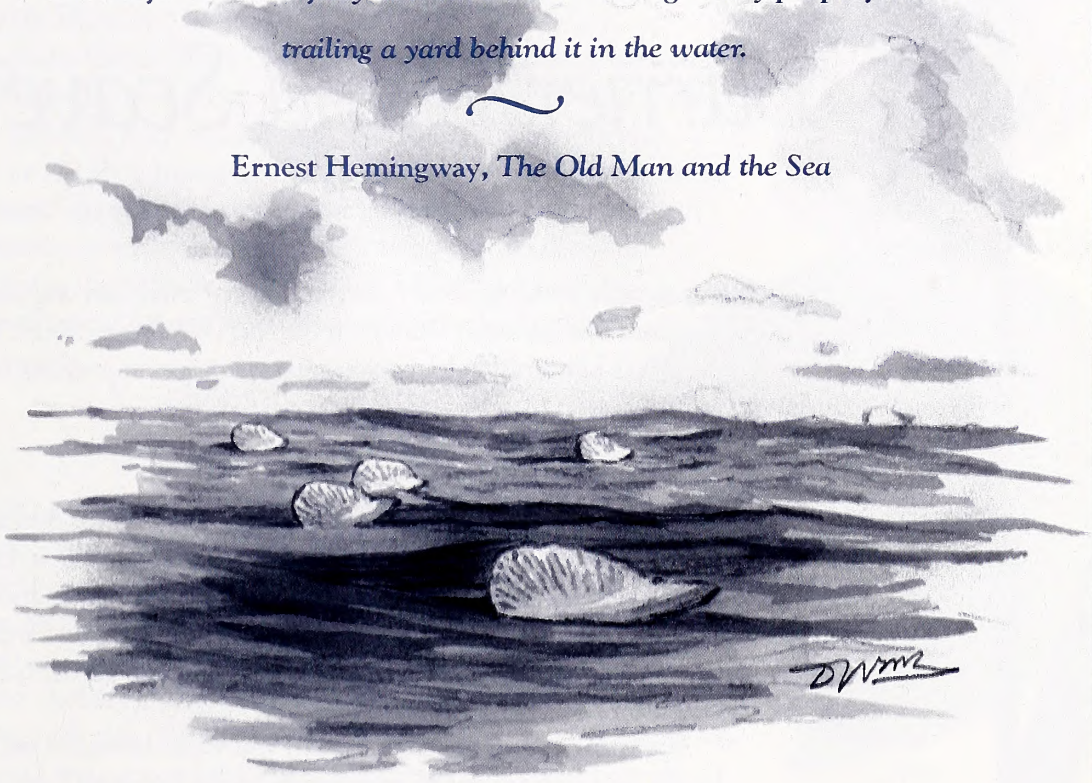
butterfishes. Most are pelagic, and several are common associates of drifting *Sargassum* beds. How they cope with the stinging cells of *Physalia* is surprising. It was assumed these fish were immune to the stinging tentacles, as most invertebrates and other fish caught in the tentacles are parayzed and consumed by *Physalia*. Close study reveals that these fish are merely agile enough to avoid the tentacles. From a boat on reasonably calm days, you can easily spot man-of-war fish swimming just 3 or 4 feet below the float and darting out to grab passing food. The diet of *Nomeus*, like most fish, shifts with age. When the fish are young they use *Physalia* for shelter, feeding on plankton that are more numerous in the shade of the man-of-war's float than in open water. As they increase in size the fish begin to feed on food captured by their host, often eating the tentacles and other parts of the host as well. The fish get away with this because they have special pouches located in the rear of their mouths. The stinging cells are harmlessly discharged in this pouch before they are swallowed. As adults, they are free-living and eat *Physalia*. If this seems like a rather one-sided relationship, it is—well, almost. It is likely that the very young man-of-war fish are tempting bait and may attract larger fish into the tentacles of *Physalia*.

A dainty pelagic sea slug, *Glaucus atlanticus*, eats whole parts of *Physalia*. It is an odd-shaped creature that looks like a miniature version of some alien spacecraft. The stinging cells pass undischarged through the slug's digestive tracts and end up in several special sacks at the back end of the sea slug. These sacks serve as substitute gills. The recycled *Physalia* stinging cells in the slug's gills protect it from nibbling fishes. Occasionally this sea slug is responsible for stings reported by bathers and since they carry the same nematocysts as their prey, they should be treated with equal respect. Like its prey, *Glaucus* floats passively on the surface. It achieves buoyancy by swallowing air and storing it in its digestive tracts.

The most distinctive feature of a man-of-war is its pink, blue and lavender balloon-like float, or pneumatophore. On very large individuals the float may be more than a foot long. John White, an artist-naturalist on Sir Walter Raleigh's 1585 expedition to the New World, illustrated flying fish, seabirds, loggerheads and the man-of-war. He was clearly fascinated by the marine life he encountered during his voyage. He prepared two plates of *Physalia*. In both he has the bubble shaped like the hull of a two-bowed ship. One plate bears the label "This is a lyuing [living] fish, and flote vpon the Sea, Some call them Carvels."

... and nothing showed on the surface of the water but some patches of yellow, sun-bleached Sargasso weed and the purple, formalized, iridescent, gelatinous bladder of a Portuguese man-of-war floating close beside the boat. It floated cheerfully as a bubble with its long deadly purple filaments trailing a yard behind it in the water.

Ernest Hemingway, *The Old Man and the Sea*



Many animals exploit oceanic currents or winds for successful careers at sea; the man-of-war makes use of both. *Physalia pelagica* is a simple life form that makes a living in a two-dimensional world, the surface of the deep open sea. These creatures are conservative in function and design. Their long tentacles hitch rides on currents while gas-filled floats serve as sails to catch the wind.

The crest of the float of the man-of-war carries a deflatable sail-like ridge. The sail can be extended or furled quickly. This is controlled by gas, mostly nitrogen, produced in the main float. The float's wall is strongly muscular allowing control of the overall shape. The colony can apparently dictate the float's angle to the wind, and a gas gland controls the size of the balloon and thereby its speed. The float constantly rolls and dips and then rights itself. I assume this prevents it from drying out.

From the pneumatophore, hang the feeding polyps, thin transparent lips that capture and engulf prey paralyzed by the long trailing tentacles. Digestive fluids are pumped into larger prey, disintegrating the tissues so that they can be sucked up by the feeding polyps and later pumped into the soupy intermediate layer and shared with the other members of the colony.

Although they are not common in winter, I have seen *Physalia* in all seasons in the Gulf Stream off Cape Hatteras. On days when the current and wind find the same direction, the seas are flat and the *Physalia* race northward. On days when the wind and current are in conflict, the colonies bob without direction like corks. At times thousands of them accumulate in the current fronts. It's fascinating to watch the bobbing and sailing purple bubbles leaning with the wind, trailing long elastic tentacles and sheltering schools of young man-of-war fish—predators that will one day betray their host. Here floating among them are yet other unseen predators that are examples of ecological economics, as well as nature's original recyclers. Yet to the unknowing it seems to be just a sleek, primitive and simple lifestyle—neon bladders drifting about but actually traveling many thousands of miles, with little expenditure of energy. However you look at it, this is the ultimate life style for the high seas. ⊠

David S. Lee is the curator of birds at the N.C. State Museum of Natural Sciences.

Grab your sunscreen and your sketchbook—
summer's the time for a

Barrier Island Scavenger Hunt

written by Ida Phillips Lynch / illustrated by Consie Powell

Have you ever thought about how the powerful forces of wind, sun and water affect North Carolina's coastal landscape and its plants and animals? Walk from the open, windswept beach inland to the sound on one of North Carolina's barrier islands and you will experience an amazing variety of habitats.

coquina clams

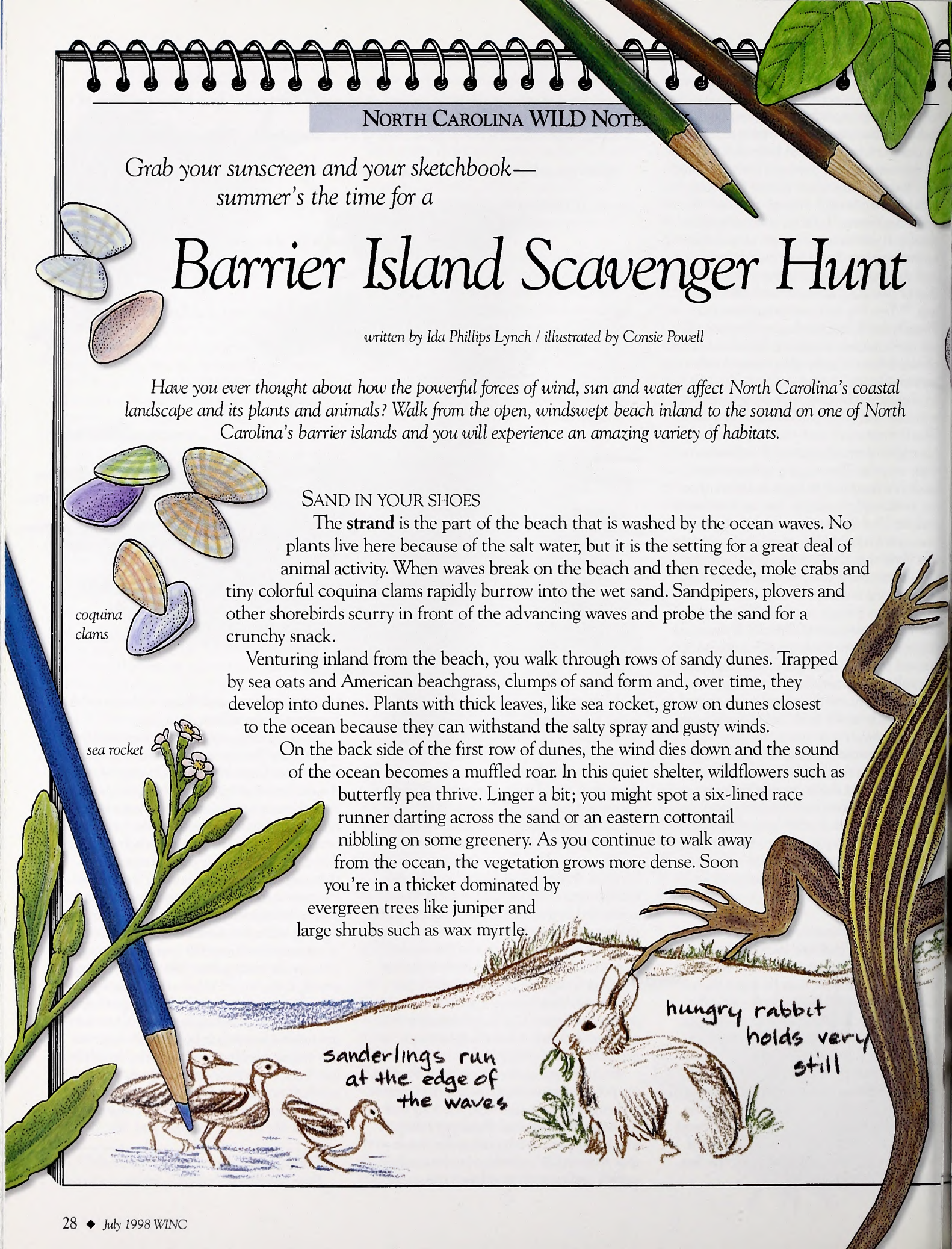
SAND IN YOUR SHOES

The **strand** is the part of the beach that is washed by the ocean waves. No plants live here because of the salt water, but it is the setting for a great deal of animal activity. When waves break on the beach and then recede, mole crabs and tiny colorful coquina clams rapidly burrow into the wet sand. Sandpipers, plovers and other shorebirds scurry in front of the advancing waves and probe the sand for a crunchy snack.

Venturing inland from the beach, you walk through rows of sandy dunes. Trapped by sea oats and American beachgrass, clumps of sand form and, over time, they develop into dunes. Plants with thick leaves, like sea rocket, grow on dunes closest to the ocean because they can withstand the salty spray and gusty winds.

sea rocket

On the back side of the first row of dunes, the wind dies down and the sound of the ocean becomes a muffled roar. In this quiet shelter, wildflowers such as butterfly pea thrive. Linger a bit; you might spot a six-lined race runner darting across the sand or an eastern cottontail nibbling on some greenery. As you continue to walk away from the ocean, the vegetation grows more dense. Soon you're in a thicket dominated by evergreen trees like juniper and large shrubs such as wax myrtle.



butterfly pea

sweet gum

Fowler's toad

A Forest at the Beach

The thicket gradually blends into a cool, dark **maritime forest** of live oaks, loblolly pines, beech and sweet gum trees. On this highest part of the island the old **stabilized dunes** are sheltered from most storms so woody trees can survive.

Maritime forests grow on a rolling **topography** of ridges and low-lying areas called swales where wetlands form. The ridges are old dunes knit together by the roots of trees and other plants. Mammals such as the gray fox inhabit the woods while reptiles and amphibians find a soggy home in the swales. Maritime forests are vital resting places for **neotropical migratory birds** as they journey between North America and the tropics.

Marsh Life

When you walk out of the maritime forest toward the mainland, you're in a new habitat—a salt marsh. Take a sniff: salt marshes smell like sulfur, kind of like rotten eggs. You might hear a persistent clicking sound. Look down to spot the source of this noise—armies of fiddler crabs wave their claws and retreate into their tunnels as you approach.

six-lined race runner

Salt marshes border the sheltered side of barrier islands. Life in the salt marsh is driven by the tides: during high tide, the flat land is flooded by sea water, while at low tide, the water retreats leaving exposed mud flats and small creeks that provide bountiful feeding grounds for herons, ibis and other wading birds.

beech

Cordgrasses are the dominant plants in North Carolina's salt marshes, and they play an important role in the food web of the coastal ecosystem. When cordgrass dies, bacteria help decompose the plant. Small invertebrates eat bits and pieces of the dead plants, forming a nutritious soup called **detritus** that nourishes oysters, clams, shrimp, mussels and mullet. These animals provide food for flounder and Atlantic croaker, which, in turn, feed larger aquatic predators.

saltmarsh cordgrass

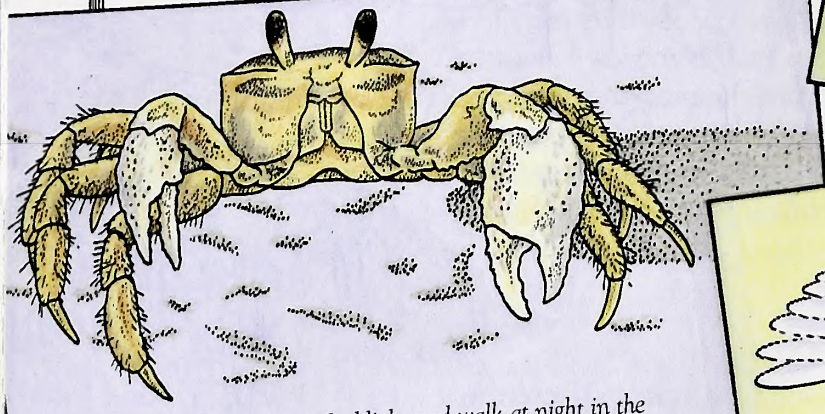
fox tracks in the damp sand in the woods

lots of little periwinkle snails climb the marsh grass

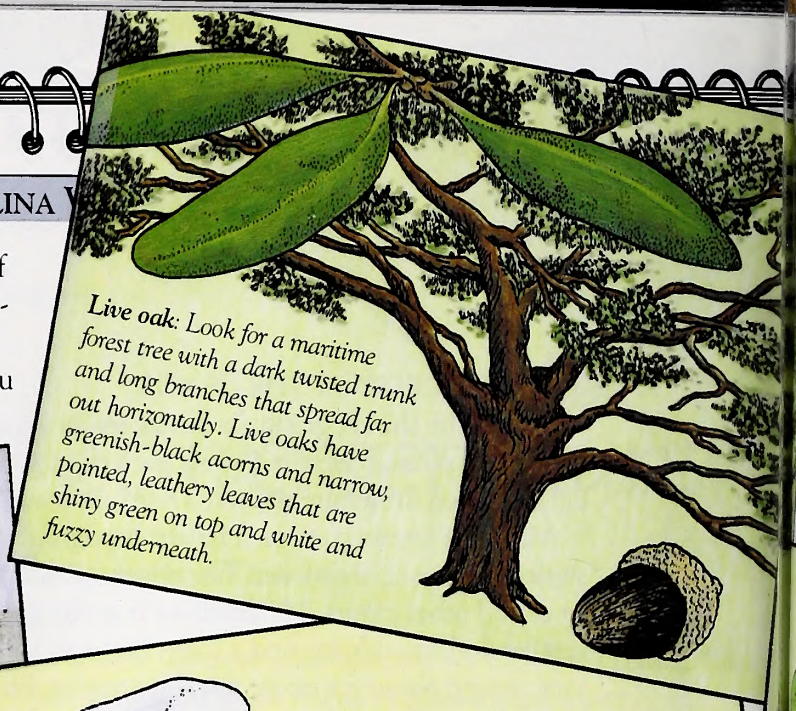
From the strand to the marsh, there's more to a barrier island than meets the eye. Explore it again, and look even closer this time.

North Carolina

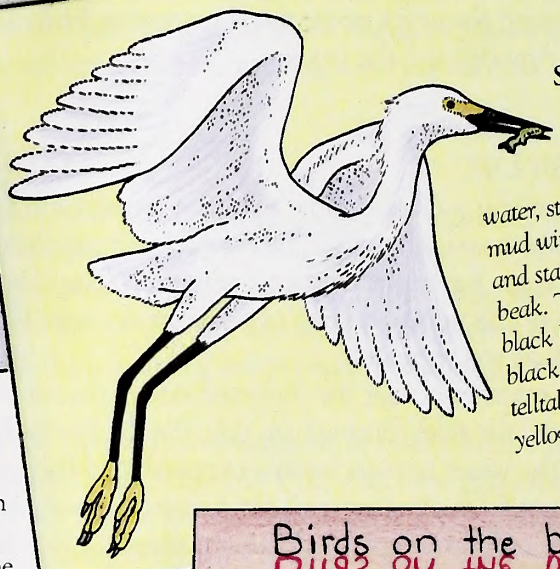
A scavenger hunt is a great way to observe some of the unique plants and animals that live in three different coastal habitats: beach, maritime forest and salt marsh. How many of these plants and animals can you find and observe when you go to the coast?



Ghost crab: Bring a flashlight and walk at night in the dry beach sand above the high tide line. Watch for funny tracks that look like lines and dots. Follow the tracks to a deep tunnel in the sand and wait patiently. You just might see this grayish white crab dart out of its tunnel.



Live oak: Look for a maritime forest tree with a dark twisted trunk and long branches that spread far out horizontally. Live oaks have greenish-black acorns and narrow, pointed, leathery leaves that are shiny green on top and white and fuzzy underneath.



Snowy egret: Watch for this white heron wading in shallow water, stirring up salt marsh mud with its feet to flush prey and stabbing at fish with its beak. The snowy egret has a black bill, yellow eyes and black legs, but its most telltale feature is its bright yellow feet.

What Does It Mean?

sound: the water between an island and the mainland
barrier islands: islands running parallel to the mainland on the Atlantic and Gulf coast that shift and change with weather. North Carolina's 23 barrier islands make up the Outer Banks
strand: land at the edge of a body of water; shore
maritime forest: a forest growing on the sound side of a barrier island
stabilized dunes: dunes that no longer move with winds or normal storms
topography: the natural features that make the surface of an area
neotropical migratory bird: any of a number of bird species that breed in North America and migrate to the tropics for winter
detritis: bits and pieces of decaying plant and animal remains

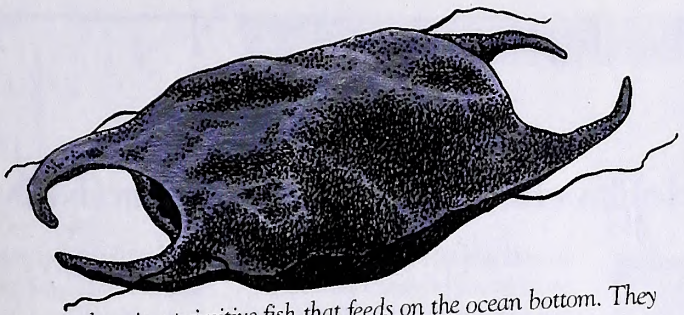
Read and Find Out

- *North Carolina Wildlife Viewing Guide* by Charles E. Roe, Falcon Press, 1992.
- *Peterson Field Guide to Southeastern and Caribbean Seashores* by Eugene H. Kaplan, Houghton Mifflin Co., 1988.
- *Seashells, Crabs and Sea Stars* by Christiane Kump Tibbitts, NorthWord Press Inc., 1996.

In *Wildlife in North Carolina*:

- "An Island Moving Through Time" by Kay Scott, July 1988.
- "The Dune Makers" by Lawrence S. Earley, June 1994.
- "Miracle in the Marsh" by Lawrence S. Earley, June 1982.

Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon.



Skate case: A skate is a primitive fish that feeds on the ocean bottom. They are diamond-shaped with long tails, and most skates lay one or two eggs in rectangular brown or black cases with pointed corners. The empty egg cases, called mermaid purses, can be found on the strand or in the drier sand above the high tide line.

Carolina anole: One of the most common lizards in a maritime forest, a Carolina anole is usually found in trees and shrubs. An anole can change color in various shades of green and brown in response to changes in temperature or humidity. Males puff out bright pink throat fans and bob their heads when they are trying to attract a female or defend their territory.

TEBOOK

Get Outside

Visit a coastal area where you can see different coastal habitats:

Hammocks Beach State Park is a 3.5-mile-long undeveloped barrier island where you can explore a beach, maritime forest and salt marsh. A passenger ferry runs to the island during spring and summer. Contact the park at 1572 Hammocks Beach Road, Swansboro, N.C. 28584, (910) 326-4881.

Nags Head Woods Preserve is a nature preserve containing a rich maritime forest, a trail system and educational programs. Contact the preserve at Nags Head Woods Ecological Preserve, 701 W. Ocean Acres Drive, Kill Devil Hills, N.C. 27948, (252) 441-2525.

Visit one of North Carolina's state aquariums and learn more about coastal habitats and wildlife:

N.C. Aquarium on Roanoke Island, P.O. Box 967, Airport Road, Manteo, N.C. 27954-0967, (252) 473-3494.

N.C. Aquarium at Pine Knoll Shores, P.O. Box 580, Atlantic Beach, N.C. 28512, (252) 247-4004.

N.C. Aquarium at Fort Fisher, 2201 Fort Fisher Blvd., Box 1, Kure Beach, N.C. 28449, (910) 458-8257.

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Wetland Metaphors: teaches students the characteristics of wetlands and their importance to wildlife and humans.

Marsh Munchers: teaches students to identify a salt marsh food web.

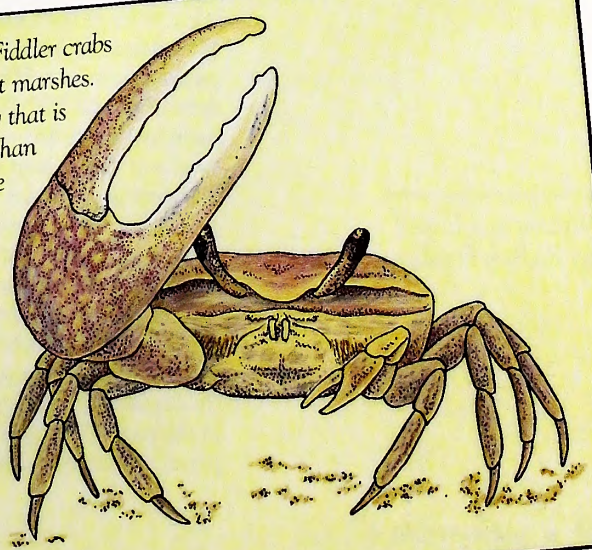
Get WILD

Upcoming advanced N.C. WILD workshops for educators include:

July 7-10—*Wildlife Tracking Workshop*. N.C. Forest Service Training Center, Crossnore. T.M. Lemon. (336) 957-4382.

August 24-25—*Black Bear Workshop*. Statesville Arts and Science Museum, Statesville. Mary Bradford. (704) 873-4734.

To sign up or to learn more details, call the listed contact or check our web page at **http://www.sips.state.nc.us/Wildlife/ConservationEd/wild/calendar/**



Sand fiddler crab: Fiddler crabs live in burrows in salt marshes. Males have one claw that is significantly bigger than the other. They wave it to attract females and to challenge other males. Look for fiddler crabs at low tide, when they gather by the thousands to feed on detritis at the marsh's edge.

Great Smoky Mountains Park Plays Key Role in Songbird Survival

LEONARD LEE RUE III

***The 500,000-acre** Great Smoky Mountains National Park serves as a summer haven for wood thrushes (above) and many other migratory songbirds. Ongoing research by a N.C. State University wildlife biologist is proving how important the park's vast unbroken forests are to breeding birds.*

Written and Edited by Rodney Foushee

The high-lonesome trills of some migratory songbirds are being heard less these days, as the birds' summer breeding grounds in many parts of the southern Appalachians fall prey to forest fragmentation, development and other natural or manmade forces.

But an ongoing study led by a North Carolina State University wildlife biologist may help scientists better understand what can be done to reverse the decline.

Using remote cameras, wooden decoy eggs and a small crew of nest spotters, Ted Simons has monitored wood thrush breeding activity in the Great Smoky Mountains National Park for the past six summers. His findings show that the 500,000-acre park, with its broad, unbroken swaths of forest, is an increasingly important summer breeding ground for wood thrushes and other species of forest-dwelling neotropical migratory songbirds.

"Despite some habitat loss due to environmental stresses and development along the park's edges, the breeding productivity of birds in the park is still quite high compared to the productivity of birds outside it," said Simons, who is an assistant professor of forestry and zoology at N.C. State.

"We estimate the park produces between 5,000 and 10,000 more wood thrushes a year, above and beyond the number needed to maintain its base population," Simons said. "Many of these birds probably disperse to unprotected areas outside the park, helping to sustain local populations there as well."

Wood thrushes are one of nearly 80 species of neotropical migratory songbirds that winter in Central or South America and travel each summer to the southern Appalachians and beyond to breed. More than 30 years of data from the North American Breeding Bird Survey show that there have been sharp drops in some regional and local populations of migratory songbirds, including wood thrushes in the southern Appalachians.

One reason thrushes in the park haven't experienced such a drop is because of the large, unbroken tracts of forest there, Simons said. Like many migratory songbirds, thrushes do best in forest interiors. Nests built too close to an open area leave young birds more vulnerable to raccoons, crows and other predators that live in forest edges.

Nest parasitism by brown-headed cowbirds is also a danger. The cowbird, a native of the Great Plains, lays its eggs in thrush nests, tricking the thrush into raising them. The thrush expends its energy raising cowbird young with far fewer thrush young being raised.

To obtain their data, Simons and his students conduct bird censuses at more than a thousand sites around the park each year. They also monitor hundreds of wood thrush nests, returning to each nest every three or four days to record what happens to the eggs and fledglings.

For the past four years, they've used remote cameras, rigged with trip-wires to wooden decoy eggs placed in some thrush nests, to snap photos of predators in the act. "We're finding a greater variety of predators than expected," Simons said. "Least weasels, black rat snakes, black bears —even a flying squirrel. We didn't expect that."

The broad range of predators showing up in the photos may explain one seeming contradiction in Simons' study: Survival rates at some nests at forest edges unexpectedly went up some years, while those at some nests in undisturbed parts of the forest dropped. "Clearly there's more involved in nest survival rates than just proximity to roads and the park boundary. In one case, we found a cowbird egg at a nest several kilometers inside the park boundary. Cowbirds have never been known to penetrate that far into the park before."

Several more summers of observation will be needed to determine if these results were isolated incidents or part of an emerging trend. Either way, Simons hopes forest managers and landowners will take the results of his study into account.

"Without a doubt, there will be increased timber cutting in the southern Appalachians in the next 20 years. Heavy logging in the last century and early in this century cleared a high percentage of the forested land in the southern Appalachians. There's been relatively little harvesting since then. Now, those trees have regrown and the pressure to expand logging in the region is increasing steadily," he said. "We need prudent planning and management, based on science, to assure that the region's forests provide both productive timberland and good habitat for wildlife."

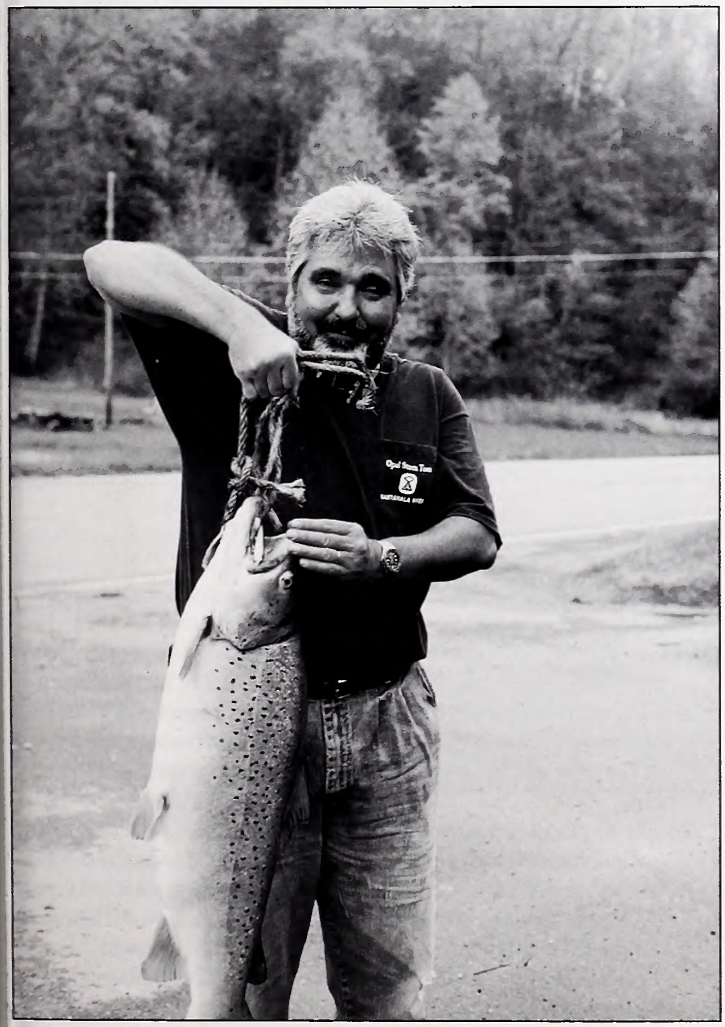
—Information courtesy of N.C. State University

24-Pound Brown Trout Shatters State Record

Robert Lee Dyer had cast the No. 11 Rapala just three times into the racing Nantahala River before the black-and-silver lure was inhaled by a monster trout. Before the morning was over, the Sylva man would land the 24-pound, 10-ounce brown trout that would best the existing state record by nearly 9 pounds.

Dyer had been fishing for only about 15 minutes below the Nantahala Dam discharge canal in Macon County when the big trout struck. "I started out fishing a Shad-Rap and got a few hits but the fish wouldn't take it," Dyer said. "Then the bites suddenly stopped. Maybe the smaller fish were scared away by the big brown trout."

Dyer tied on the floating Rapala and added a split shot about a foot above the lure to get it down just below the surface of the swift current. It was 10:30 a.m. on April 17. "I was working the lure about an inch below the surface when I saw a gold flash the size of a dinner plate, and then the drag of my reel began singing," he said. The monster brownie had taken the lure sideways in its mouth and was impaled by all three of its treble hooks. The trout made three big runs stripping 150 yards of the 200-yard capacity off Dyer's bait-casting reel each time. But the 10-pound-test line held.



ROBERT DYER

Record Brown Trout: *Robert Dyer of Sylva set a new state record with this 24-pound, 10-ounce brown trout taken from the Nantahala River in April. The lure Dyer used to catch the monster trout is still lodged in the fish's mouth in this photo.*

After about 30 minutes, Dyer had played the big trout down enough to get it to the bank, but the fish continued to resist and seek shelter in the swift current. With no net available, Dyer made a final attempt to get the fish's head out of the water and two of his buddies grabbed the trout around the body while he grabbed its head. The three men wrestled the behemoth out of the river.

Dyer, a supervisor with Nantahala Power & Light Co., is no stranger to big fish. An avid tournament angler, he has landed an 11-pound, 9-ounce largemouth bass and a 9-pound rainbow trout. He also briefly held the first spotted bass record in North Carolina.

Though the 47-year-old has fished the area since he was a boy, he never suspected there were trout more than 20 pounds in the river. "I knew there were some 10-pounders below the dam, but I didn't know anything existed like this fish," he said.

Dyer's catch shattered the old state record brown trout held by Thomas H. Meek III. That fish, also taken on a Rapala, weighed 15 pounds, 13 ounces.

Perhaps more amazing than the size of Dyer's catch were the contents of its stomach. While cleaning the fish for mounting, the taxidermist discovered a crawfish and a 10-inch rainbow trout in the record fish's belly. "This brown trout had graduated from flies a long time ago," Dyer noted.

State Parks Map Guide Available

Whether you're planning a day trip or a weekend camping adventure, the North Carolina State Parks system has plenty to offer outdoor enthusiasts. A new publication, the *North Carolina State Parks Map Guide*, puts all of North Carolina's 34 state parks and recreation areas at your fingertips.

Available at bookstores and outdoor supply centers across the state, this handy spiral-bound guide provides detailed maps and descriptions of all of North Carolina's state parks. An area is also provided to record personal notes about your visit to each park.

The map guide cost $14.95 with a portion of the sales being donated to the N.C. Division of Parks and Recreation.

Observant Reader Knows Her Cotton

Dear Wildlife:

I just received the April issue of *Wildlife in North Carolina*. The caption on page 23 under the picture of the Halifax County farmer says he's spraying his soybean field. Isn't he really spraying a cotton field?

My husband and I really enjoy your magazine.

—*Dale M. Harper*
Nashville, N.C.

Editor's Response: This was one of several letters from observant readers who definitely know their field crops. The white balls of cotton on the ground in the photo should have been a dead give away. Our mistake!

Commission Adds 6,022 Acres to Game Lands Program

The N.C. Wildlife Resources Commission has preserved 6,022 acres of critical gum/cypress swamp in southeastern North Carolina for wildlife habitat and outdoor recreation.

The Wildlife Commission purchased the Wananish tract in 1996 from International Paper Co. with the support of Natural Heritage Trust funds.

The tract, located in northeastern Columbus County, is part of the Friar Swamp watershed, which serves as the headwaters for Lake Waccamaw. The nationally significant lake is designated critical habitat for various rare and endangered freshwater fish and mussels including the Waccamaw silverside and the Waccamaw spike. Friar Swamp serves as a crucial wetland buffer for the lake and also provides key habitat for black bears, whitetailed deer, marsh rabbits, waterfowl, alligators and songbirds.

Wildlife Commission personnel completed marking the tract's 24 miles of boundary this past spring. The Wananish tract will be added to the Columbus County Game Lands this month and will be open to public hunting three days per week beginning this fall. The entire tract is designated as a bear sanctuary. The area is also open to public fishing, bird watching and nature study.

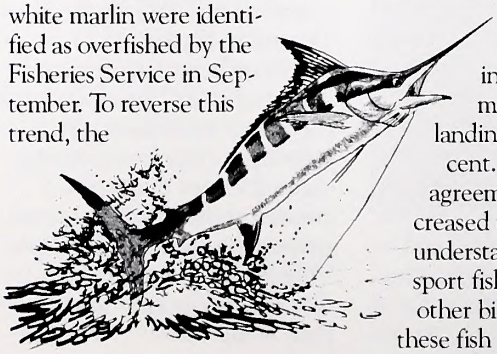
RODNEY FOUSHEE

***More than 6,000 acres of** important wetlands in Columbus County have been protected for bears and other wildlife thanks to the N.C. Wildlife Resources Commission. Supervising Wildlife Biologist Earl Gillis (above) helps mark the new game land for public hunting and outdoor recreation.*

Size Limits Increased to Protect Marlin

The National Marine Fisheries Service has established new minimum size limits for blue marlin and white marlin to stop the decline of these valuable gamefish populations along the Atlantic Seaboard.

Atlantic blue marlin and white marlin were identified as overfished by the Fisheries Service in September. To reverse this trend, the minimum size for landing blue marlin has been raised from 86 inches to 96 inches, and the minimum size for white marlin increased from 62 inches to 66 inches. The minimum size for sailfish remains unchanged at 57 inches.



The new size limits are part of an international commitment to reduce marlin landings by at least 25 percent. The international agreement also calls for increased monitoring to better understand the impacts of sport fishing on marlin and other billfish species. Since these fish are highly migratory and are subject to fishing pressures from many countries, the Fisheries Service is working with other nations to implement international conservation and management measures.

Under the new regulations, all fishing tournaments for billfish involving score keeping or awards must be registered with the Fisheries Service in advance of the event. Some tournaments will be selected to submit a record of catch and fishing effort.

For registration information, contact the National Marine Fisheries Service at 75 Virginia Beach Drive, Miami, Fla., 33149.

—*Information courtesy of the National Marine Fisheries Service*

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

July 1-19

An exhibit titled "Working Birds: Decoys and Their Carvers" will be on display at the Museum of the Albemarle in Elizabeth City. The exhibit features historic waterfowl decoys from Currituck, Dare, Hyde and Pasquotank counties that represent the distinctive style of northeastern North Carolina. For more information, call the museum at (252) 335-1453.

July 11

The 35th annual Coon Dog Day will be celebrated in Saluda. Events will include crafts, food and entertainment as well as a night hunt, dog show and a treeing contest sponsored by the Saluda Coon Hunters Association. For more information, call (828) 749-2581.

July 18

A workshop titled "Hooves, Claws and Paws" will be held at the Wildlife Commission's Pisgah Center for Wildlife Education near Brevard. This program will focus on the identification of common mammal tracks. For registration information, call the center at (828) 877-4423.

July 1-31

"Hunters of the Sky," an exhibition focusing on birds of prey, will be held at the Museum of Life and Science in Durham. The exhibition will explore the fascinating world of hawks, eagles, falcons and owls. For more information, call the museum at (919) 220-5429.

Aug. 1

BugFest will be held at the N.C. Museum of Natural Sciences in downtown Raleigh. The popular educational program will feature displays, exhibits and activities related to insects and arthropods. The highlight of the free event is the Cafe Insecta where various insect dishes will be served up for tasting. For more information, call Bob Flook at (919) 733-7450.

Forbush, Chowan Schools Win Hunter Education Tournament

Forbush High School and Chowan Middle School won team championships in the N.C. Wildlife Resources Commission's annual Hunter Education Tournament held recently at Millstone 4-H Camp near Ellerbe.

Forbush scored 3,038 points to take top honors in the senior division while Chowan posted 2,731 points in the junior division of the competition, which featured more than 450 students from across North Carolina.

West Davidson High School placed second in the senior division with 2,910 points and John A. Holmes High School took third with 2,907 points. Forbush Middle School placed second in the junior competition with 2,544 points and Swain County Middle School placed third with 2,526 points.

Scores are based on rifle, shotgun and archery competition as well as a written test on hunter skills.

Heath Adams of Forbush was the top overall individual scorer with 776 points. John Mauser of Holmes took second in the senior division with 748 points after winning a shoot-off with John Bowers of West Davidson, who placed third.

KEN TAYLOR

***Rifle marksmanship is just one of** the areas of competition at the Wildlife Commission's annual Hunter Education Tournament. Forbush High and Chowan Middle schools won team championships at this year's event held near Ellerbe.*

Gabriel Simcox of Swain Middle placed second in the junior competition with 670 points and Matthew Smith of Forbush Middle took third with 650 points.

—Bodie McDowell

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through April 1998

Principal Balance
$25,097,456.48

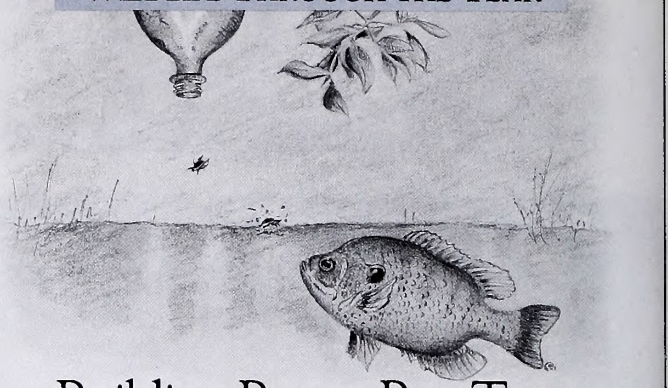
Interest Earned
$25,846,825.51

Total Receipts
$50,944,281.99

Interest Used
$13,479,807.04

Fund Balance
$37,464,474.95

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



Building Better Bug Traps

by Rodney Foushee

July is the time when biting flies and other winged critters emerge in full force to feed on you and your prized shrubbery. Though pesticides can help control problem insects, these chemicals can often cause more damage than good to beneficial insects and other wildlife. Here are two alternative bug traps recommended by readers to safely control and naturally recycle these summer visitors.

Bream Beetles: Since their accidental introduction in the early 20th century, Japanese beetles have spread throughout the eastern United States devouring countless plants along the way. Though these foreign invaders are attracted to more than 300 mostly ornamental plant species, their affinity for roses is legendary. As any gardener knows, a group of beetles can make quick work of a rose bloom.

Japanese beetle traps are readily available which use pheromones to attract the bugs, but to be effective the traps must be emptied regularly—a messy task at best. Riley Horn of Clayton has improved on this basic design by eliminating the bag and using bluegills to dispose of the beetles. The first step to building the trap is to cut the bottom off a 2-liter plastic soda bottle and hang the scented portion of a standard beetle trap inside the inverted bottle. Hang the bottle over a suitable pond and let the bluegills do all the work. The fish will quickly learn of the dependable food source and will readily grab the beetles as soon as they hit the water.

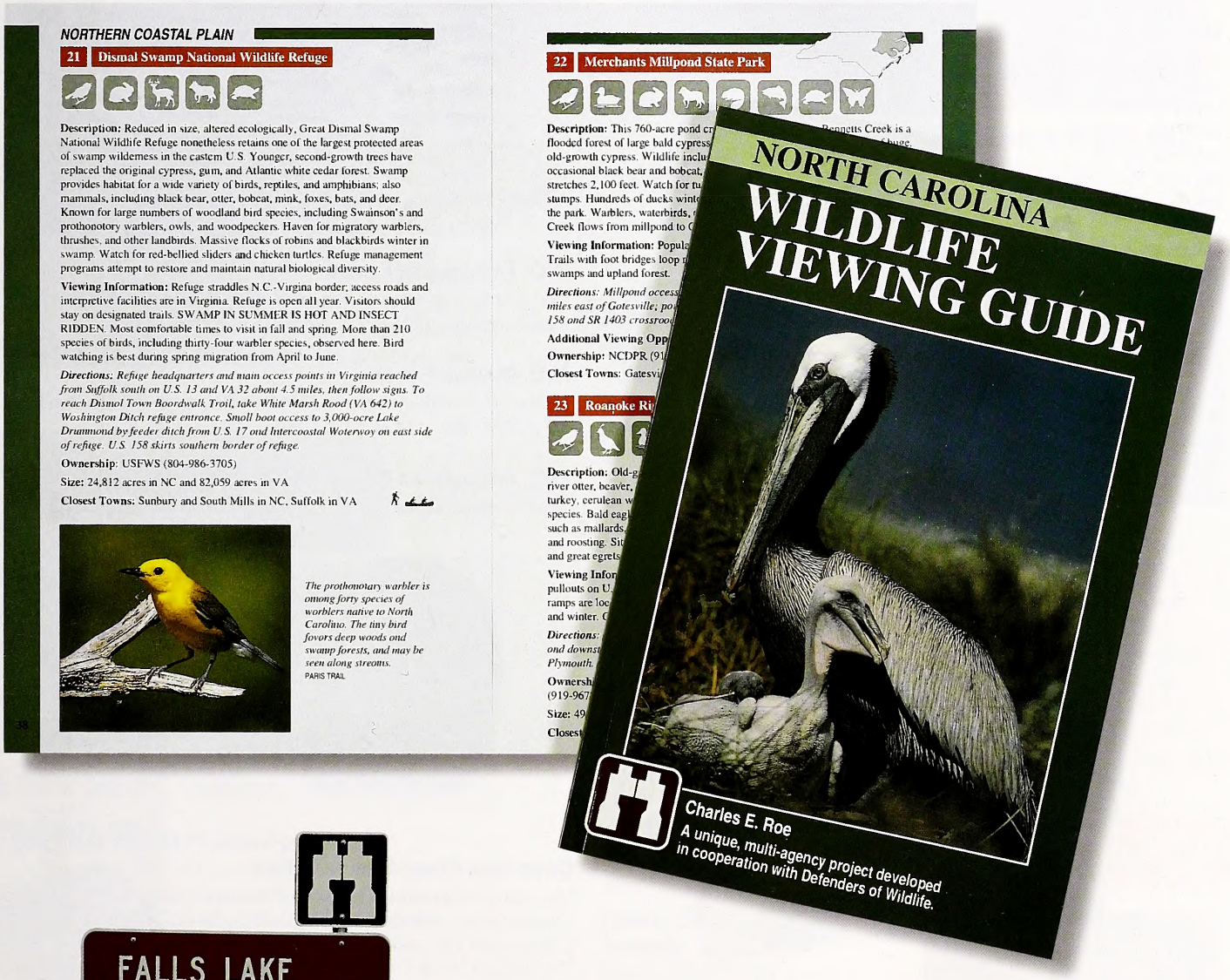
Fly Box Traps: As anyone who has spent time at the coast during the summer can confirm, biting greenhead flies and deer flies can be a real annoyance. An inexpensive flytrap developed in coastal Delaware can provide ecologically safe relief. To build the trap, construct a box from plywood with side panels measuring 16 by 32 inches. Cover the box's top with fine screen; then use two pieces of screen attached to the box's bottom to form an upside-down funnel with a small slit at the top to allow the flies in. Paint the box glossy black and mount it on legs so that the bottom of the trap is two feet above the ground. (For a diagram of the trap, check out this web address: *http://www.state.nc.us/Wildlife/trap.htm)*

Place the traps near wetlands close to shrubby areas. It is best to keep the vegetation low around the box. The heat-seeking flies, which are attracted to the trap's color and the warmth it produces, rise through the bottom of the box and become trapped inside. Removal of dead flies is not necessary. Ants and bacteria will quickly consume their bodies.

N.C. WILD STORE

Roam with a View

Wildlife is nearer than you think. The secret is knowing where and when to look.



As you travel across North Carolina, look for these special highways signs that identify wildlife viewing sites.

North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. Each site was selected by a panel of wildlife experts from across the state. Included are detailed descriptions of each viewing site, maps and access information, helpful viewing tips and more than 50 color photos. **$5.95.**

ITEM CODE **N6**

More terrific items ☛

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

White, 100% cotton (preshrunk) T-shirts are guaranteed for comfort and durability. Each shirt features an original design.

N.C. WILD T-SHIRT

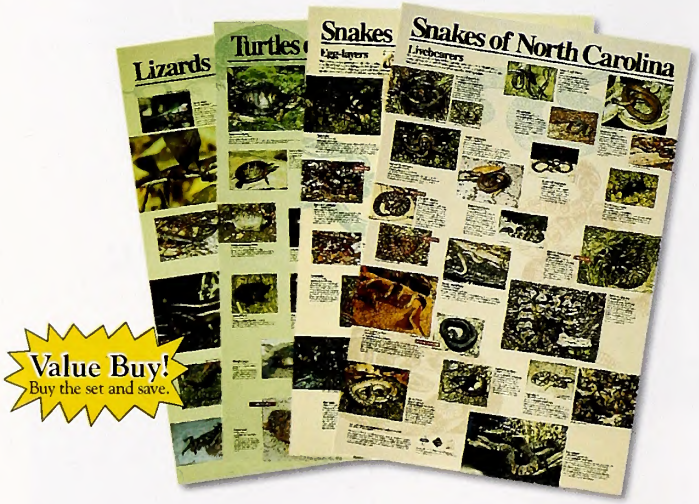
N.C. WILD logo printed on front and colorful art on back. $14.50.

ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE IN N.C. T-SHIRT

WINC magazine logo on front pocket. Tundra swan art on back. $14.50.

ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)



LIZARDS OF N.C.

Shows all 12 of the state's lizard species. 22" x 34". $6. ITEM CODE **P3**

TURTLES OF N.C.

Shows all 21 of the state's turtle species. 22" x 34". $6. ITEM CODE **P4**

SNAKES OF N.C. (LIVEBEARERS)

Shows all 17 of the state's livebearing snake species. 22" x 34". $6. ITEM CODE **P5**

SNAKES OF N.C. (EGGLAYERS)

Shows all 19 of the state's egg-laying snake species. 22" x 34". $6. ITEM CODE **P8**

SET OF 4 POSTERS

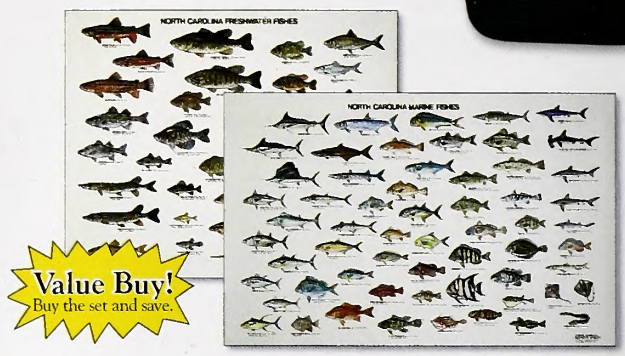
You'll save $6 by purchasing the set of four posters above. $18.

ITEM CODE **P10**

N.C. WILD CAP

N.C. WILD logo is embroidered on a pro-shape, brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. $16.50.

ITEM CODE **A1**



N.C. FRESHWATER FISHES

Find your favorite fish with this color poster showing 36 of the state's freshwater fishes. 28" x 22½". $6. ITEM CODE **P6**

N.C. MARINE FISHES

All the colors of the sea can be found on this poster of 60 marine fishes. 35" x 22½". $6. ITEM CODE **P7**

N.C. FRESHWATER FISHES AND N.C. MARINE FISHES

Save $2 when you buy both posters as a set. $10. ITEM CODE **P9**

WILDLIFE IN N.C. CAP

Buck deer silhouette with magazine logo is embroidered on a pro-shape, washed-canvas cotton cap with an adjustable cloth strap and buckle closure. Two-tone cap is navy/stone. $16.50.

ITEM CODE **A2**

DOGS THAT POINT, FISH THAT BITE

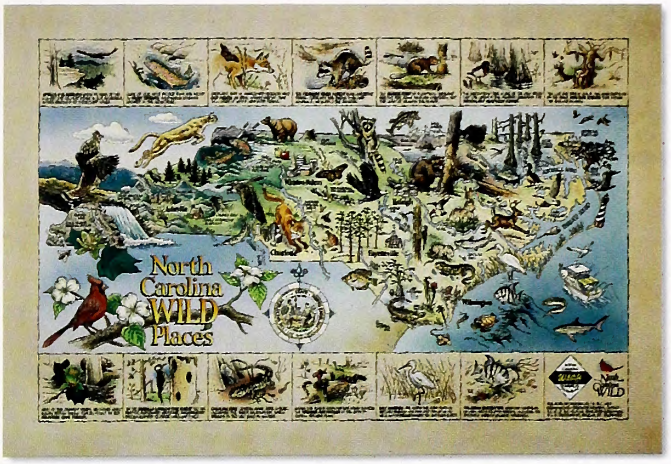
Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission; hardbound; 220 pages. $19.95. ITEM CODE **M8**

WILDLIFE IN N.C. CAP

Brook trout and magazine logo are embroidered on a sage-colored, premium weight, pigment-dyed, brushed cotton cap with an unstructured front, an extended bill, and a nubuck suede closure. $16.50. ITEM CODE **A3**

Nature's Ways Collection

Since 1978, the illustrated "Nature's Ways" essays in the pages of *Wildlife in North Carolina* have explored wildlife species, ecosystems and the wonders of the natural world. Now more than 200 of these essays are available in paperback. Sold only as a six-volume set. $27.50. ITEM CODE **M9**



North Carolina WILD Places Map

Artist's Proof. $40. ITEM CODE **E2**
Limited Edition. $25. ITEM CODE **E3**
Poster. $6. ITEM CODE **E4**

Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.
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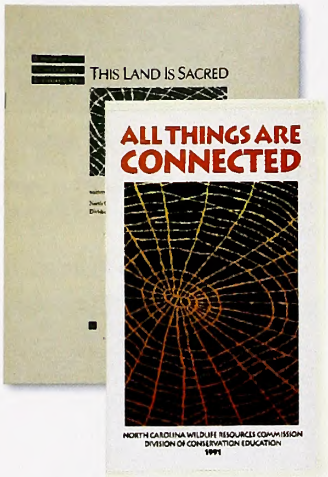

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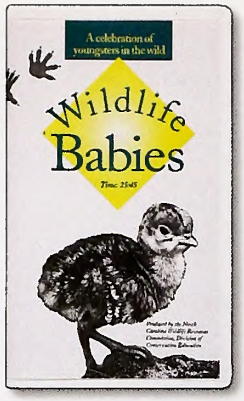

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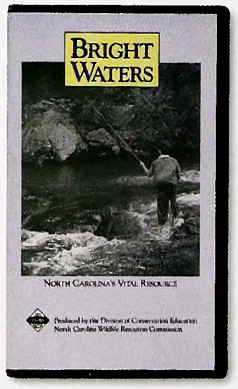

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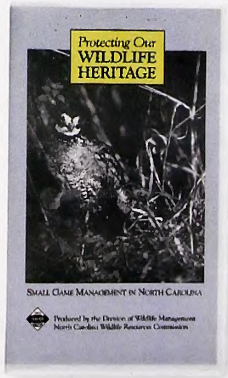

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Wildlife Commission **Spotlight**

Roanoke River Shad Restoration

ILLUSTRATION BY DUANE RAVER

"If our efforts are successful, the numbers of hatchery-grown shad returning to the spawning grounds should be large at first, then diminish over time as the population recovers and natural reproduction takes place."

—James W. Kornegay, fisheries biologist with the N.C. Wildlife Resources Commission

Highway construction, habitat destruction

One unfortunate byproduct of highway construction is the loss of wildlife habitat. For example, during 1997 heavy-equipment causeways were constructed across the Roanoke River at the Interstate 95 bridge replacement site, and openings in these causeways were inadequate to allow fish passage. During two spring seasons, upstream spawning migrations of striped bass, hickory shad, American shad and blueback herring were impeded by the causeways.

Turning a negative into a positive

To mitigate losses resulting from I-95 construction on the Roanoke River, the state Department of Transportation has given $330,000 to the N.C. Wildlife Resources Commission. The Wildlife Commission has decided to use those funds to restore American shad on the Roanoke River because the fish need spawning grounds on the Roanoke River upstream of I-95.

Stocking up for the future

The Roanoke River American Shad Restoration Project will be a joint effort between the Wildlife Commission, the N.C. Division of Marine Fisheries, the U.S. Fish and Wildlife Service and N.C. State University. Over the next seven years, American shad eggs will be hatched at the Edenton National Fish Hatchery. Fry—newly hatched fish—will be grown for approximately nine days, then exposed to an antibiotic that leaves their bones detectable under a black light. After three or four years of stocking, biologists will collect samples of the American shad population from Roanoke River and will examine their bones to determine what percentage are hatchery-grown fish.

New Day Dawning

On a misty morning long ago, an angler prepares for another day on Currituck Sound's fabled bass waters. The bass have struggled in Currituck since those halcyon days, but today there's new hope for them. Story on p. 4.

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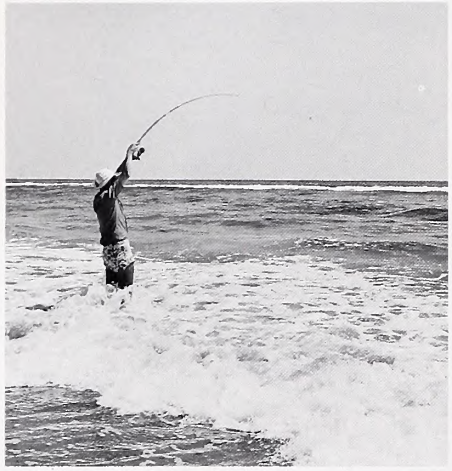
Fishing the Big Pond

by Jim Dean ©1998

"It's just like an old farm pond today, isn't it?" the fisherman said, as he set the butt of his surf rod in a sand spike one hot day last August. "We haven't caught much. My 10-year-old son caught a couple of pompano and sea mullet earlier. Beginner's luck, I guess."

The water was translucent emerald in the deeper slough behind the gentle shorebreak, fading to pale yellow over the shallow sandbar that ran parallel to the beach. Behind the bar, a deeper blueish green stretched to the near cloudless horizon.



JIM DEAN

We had walked perhaps a mile down the beach looking for shells, stopping to chat with anyone who was fishing. Most of the surf fishermen were vacationers with limited seasonal experience, and their luck had been almost universally poor. Yet a couple of groups had done very well; their coolers were steadily filling with spots, sea mullet, pompano and the occasional flounder. It was easy to see why.

Most of the inexperienced anglers were heaving their bait as far as they could throw it using long, stout surf rods and 4- or 5-ounce pyramid sinkers. Worse, their hooks were far too big, and their bait was spoiling in the sun on top of a cooler. Not to be too blunt about it, they were fishing in the wrong place with the wrong tackle and the wrong bait. Yet, they weren't that far wrong—just enough to cost them a good catch.

By contrast, the successful fishermen were using small hooks on simple, two-hook bottom rigs, and their bait—generally shrimp—was fresh enough to fry for supper and they kept it ice cold in the cooler. But most important, they were fishing practically at their feet, making very short casts to place the baits in the trough just under the curl of the inshore breakers. That's almost invariably the preferred feeding place of most ocean panfish, and especially common species like sea mullet, spots and pompano because that's where food they like is most abundant or is exposed by the turbulence. No wonder that fisherman's son had caught the only fish—he hadn't learned to cast far enough to get his bait out of harm's way.

"Considering how easy it usually is to catch supper from the surf even during the hot summer months, it is surprising how few vacationing fishermen know how to do it."

Considering how easy it usually is to catch supper from the surf even during the hot summer months, it is surprising how few vacationing fishermen know how to do it. It's simple, really, and you don't need a lot of fancy gear.

Let's start with the bait. It must be fresh. Shrimp is hard to beat, but avoid any labeled as "bait" since it is likely to be old, especially if you buy it at a tackle shop or pier. Smell it, feel it. It should have very little smell, be firm and have a translucent greenish color rather than blackish gray or red. Shell it and cut it into relatively small pieces when you use it. You'll waste less and, since large pieces of bait are more often nibbled than gobbled, you'll also miss fewer bites.

Other baits can also be excellent. Live soft-shelled mole crabs—often called sand fleas—that you can sometimes catch in the backwash of the summer surf are unbeatable for sea mullet and big pompano. Live bloodworms are good for spots. Bluefish like fresh jumping mullet, and flounders can often be caught on a strip of white flounder belly, mullet or squid dragged slowly along under the shorebreak—a round-bottom, rather than pyramid sinker is best for this. Overall, however, shrimp is hard to beat.

Use small hooks—I like No. 5 long-shanked hooks—but Nos. 4 and 6 are also fine. Though you can use heavier gear if that's what you have, a freshwater spinning rod 6- to 7-feet long balanced with a reel spooled with 10-pound monofilament is ideal for sinkers up to 2 ounces—rarely will you need more weight. When the surf is calm and fish are close in, a big spot or sea mullet is even more fun on ultra-light spinning tackle with 6-pound test and sinkers up to about an ounce.

During the summer months, your best luck will usually occur in early morning or late afternoon, but even during mid-day you may have good luck on the last two hours of the falling tide, and again on the last two hours before high tide. Once you find the best time and tide, chances are that pattern will remain consistent until weather and water conditions change. Try different baits, concentrating on the shorebreak, but fish the deeper part of the slough occasionally, just in case.

Those fish will never taste better than the day they are caught. How does a platter of fried sea mullet, spots and pompano sound with side dishes of sliced homegrown tomatoes in sugar and vinegar, corn on the cob, cornbread and sweet iced tea?

Yeah, thought so.

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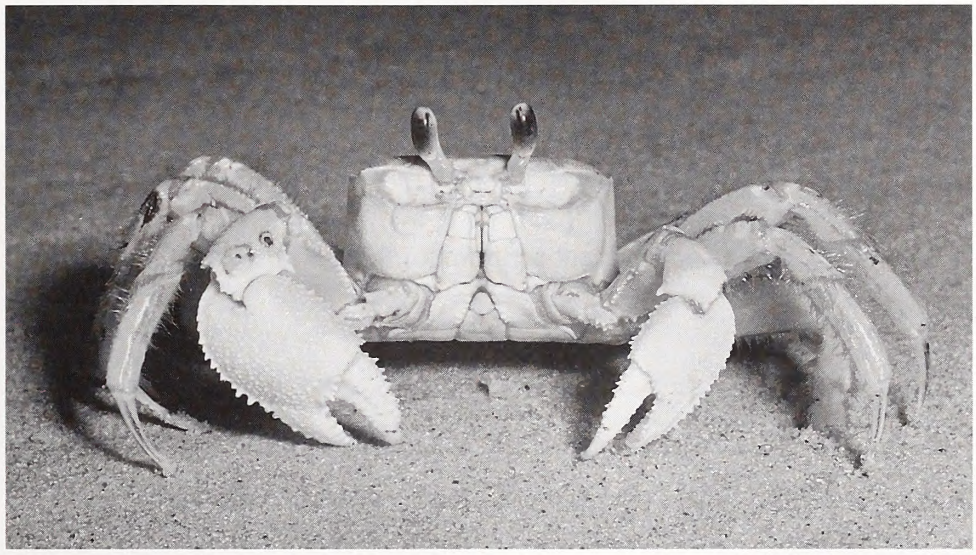

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Fact: *With its jointed legs, the ghost crab can move backwards, forwards and sideways on sandy beaches. It feeds on sea turtle eggs, coquinas and mole crabs and it digs burrows in which it hides its prey.*

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CONTENTS

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

August 1998 *Volume 62, Number 8*

FEATURES

4 **To Buy a Mountain** *written by Lawrence S. Earley*
photographed by Ken Taylor
The Wildlife Commission's acquisition of the Rollins Tract tripled the size of the South Mountains Game Land. More than that, the giant purchase proved the power of partnerships.

page 10

10 **Flies in the Salt** *written and photographed by Joel Arrington* ©1998
With fly tackle strong enough to subdue even a bluefin tuna, today's saltwater angler has more options than ever before. This veteran coastal fisherman tells you where to go, what to catch and how.

page 16

16 **Young Hunters**

Preserving a Southern Heritage *written by Chris Powell*.... 16
Hunting traditions are in danger in North Carolina as fewer boys and girls learn to hunt. That's why these organized youth hunts are so important.

Banking Tomorrows *written by Mike Gaddis* ©1998..... 22
illustrated by Chris Armstrong ©1998
His first hunt wasn't exactly what the boy had expected. But for the author, the experience was almost more than he could bear.

Why I Hunt with My Kids (and other tall tales) 24
written by Dale Caveny
illustrated by Jackie Pittman ©1998
Hunting with a son or daughter is sometimes less than it's cracked up to be.

page 4

DEPARTMENTS

page 28

Our Natural Heritage *by Jim Dean* ©1998 .....**inside cover**
Nature's Ways *by David Lee* ©1998 2
N.C. WILD Notebook *by Lawrence S. Earley* 28
Back Porch *by Rodney Foushee* 32
Wildlife Through the Year *by Rodney Foushee* 36

Cover *A father and son share a quiet moment at the end of a day spent afield. Photograph by F. Eugene Hester.* ©1998

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Deep Sea Slime Machine

written by David Lee ©1998
illustrated by David Williams

They aren't true fish, they don't have pretty faces and they're slimy and horrible. *Did I mention they were slimy and horrible?* They're hagfish!

In North Carolina, hagfish occur only in cold, deep waters along the edge of our outer continental shelf. The species off our coast is a pale pink color, the skin is loose and wrinkly and a few whiskers grow around its obscene-looking mouth. They can be a foot or more in length. Living at depths of 1,600 feet and more, where there is little light, hagfish are eyeless, although they do have skin receptors that sense faint light. Like many deep-sea animals they have photophores that glow like luminescence.

They are ugly, these hagfish, and yet their ugliness is only skin deep—inside they are structurally simple. They have a mouth and a single nostril at one end for water intake, and a hole near mid-body to let the water out. Their digestive tracts, nervous systems and respiratory systems are just long tubes.

Every hagfish has both male and female parts, but for most individuals only the female parts are functional. Seahags are scaleless, finless, toothless and brainless (they have a bump for a brain box). They are also jawless so they are forced to feed like vacuum cleaners. Because of this they are primarily scavengers. The hagfish has been called "an ocean vulture," working its way into the dead or wounded body of marine animals through any orifice and eating its tissues from the inside. The far end of the wiggly pink sucking tube is flattened and somewhat paddle-like. The hagfish uses the paddle to swim, but spends most of its time burrowed into the organic ooze of the sea floor.

Hagfish are principally known for their disgusting ability to produce enormous amounts of slime. There are 60 species worldwide and the common one found in North Carolina has 90 slime-oozing pores. This is Ghost Busters-strength slime! Its function is to discourage predators—the slime is full of little cords of protein that choke predatory fishes by clogging up their gills. In minutes, captured individuals can ooze out enough slime to fill a gallon bucket and displace all its water.

A crew in a small submersible once tried to capture some hagfish for researchers. They set a trap baited with fish heads and instantly attracted hundreds of hags. The result was a feeding frenzy of hagfish all trying to force themselves into the trap. This activity created such quantities of slime that the crew feared the thrusters of the sub would become inoperable. When the sub was finally hauled onto the deck of the support ship the entire exterior had to be de-slimed with high-pressure hoses.

Hagfish can also tie themselves in knots, a peculiar ability that is also a defensive adaptation. Knotting enables them to slip out of their slimy coats or elude a predator.

Calling these animals fish is misleading, of course. Fossil records show that hagfish have been around for 220 million years and creatures that are like hagfish go back more than 500 million years. By the dictionary definition they are fish, but from an evolutionary point of view hagfish are not even distantly related to goldfish, tuna, trout and other familiar species. Most textbooks place them in the same group as lampreys, but lampreys are much more advanced and the only shared similarities are their lack of jaws and their eel-like shapes. Lampreys and hagfish have different feeding methods, different forms of reproduction, and totally different life cycles. Their nervous systems are also on quite different plans. While it is obvious that hagfish are not directly related to true modern-day bony fishes, it is likely that they are not kin to the lampreys either.

In some ways hagfish are more closely related to seasquirts and other primitive cordates than they are to modern, living vertebrates. They even show resemblances to the many makes and models of jawless fishes that once roamed the seas during Silurian and Devonian time (438 to 360 million years ago), but that have passed into the darkness of extinction.

David Lee is the curator of birds at the N.C. Museum of Natural Sciences in Raleigh.

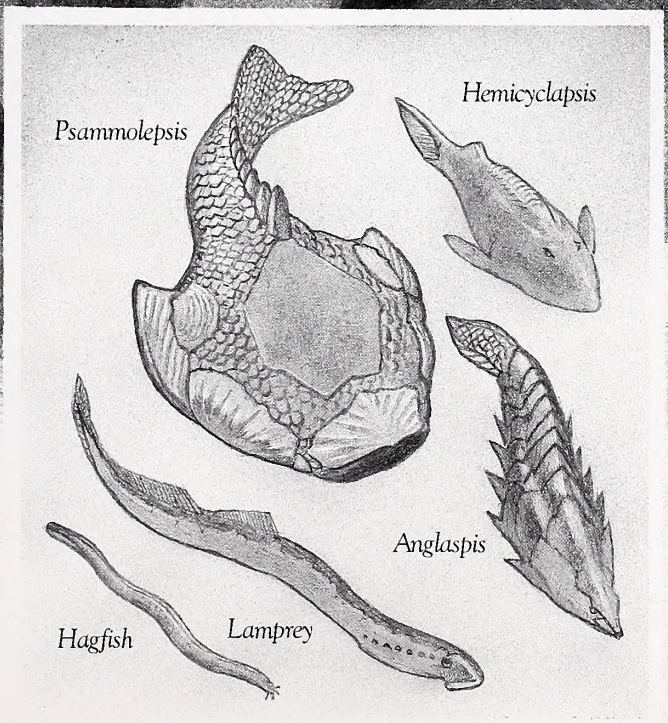
Other Reading:

- Jørgen Mørup Jørgensen et al. [editors], *The Biology of Hagfishes* (Chapman & Hall, 1998).
- Steve Parker, *Fish*—Eyewitness Books (Alfred A. Knopf, 1990).

Surfing the Web

- For a "defense" of the unlovely hagfish, see this interesting site. *Address:* http://oberon.educ.sfu.ca/splash/wednesday/hagfish.htm
- This home page contains photos of hagfish and lamprey. *Address:* http://www.cyhaus.com/marine/agnatha.htm
- This aquarium site has a good discussion of the differences between marine worms and "worm-like" organisms such as hagfish. *Address:* http://www.aquarium.net/1197/1197_4.sht

A hash of hagfish squirm in *and out of a dead fish, consuming its flesh and reducing it to bones within minutes. The eyeless hagfish are nature's deep-water scavengers, occupying dark oceanic depths nearly a third of a mile below the surface.*



Although the hagfish has *been placed in the taxonomic group that includes the lamprey, some of its primitive features resemble those of the jawless fishes that lived in the Silurian and Devonian seas more than 400 million years ago. Extinct armored ostracoderms like the psammolepsis, hemicyclapsis and anglaspis were among the earliest vertebrates.*

D. Williams

To Buy a MOUNTAIN

The Wildlife Commission's acquisition of the Rollins Tract tripled the size of the South Mountains Game Land. More than that, the giant purchase proved the power of partnerships.

written by Lawrence S. Earley / photographed by Ken Taylor

***Like a multicolored** carpet, mixed hardwood forests hug the rolling panorama of the South Mountains in the western foothills. About 35,000 acres of this prized landscape have been protected in perpetuity for the people of North Carolina.*

They came from Shelby and Forest City, from Charlotte and Casar, from Morganton and Pleasant Grove, from Hickory and Rhodhiss. They gathered beneath the striped tent in plastic chairs, drank sweet soft drinks, wiped sweat from their faces, applauded long and hard for each other during the festivities and looked at each other with slightly dazed grins. "Can you believe it?" their faces seemed to say. "Can you believe we bought a mountain?"

***The yellow lady's slipper** is one of nearly 300 vascular plant species that are found in South Mountains. The area's botanical wonders led the Nature Conservancy to make the purchase of the Rollins Tract a major priority.*

The occasion was the Foothills Conservancy of North Carolina's celebration, in May, of the state's purchase of 26 square miles of South Mountains, primarily in Cleveland and Rutherford counties. Known as the Rollins Tract, the property was quite possibly the largest privately owned forested tract remaining in the North Carolina Piedmont, and Foothills Conservancy members had worked for four years to put the property into public ownership. Now it was done —17,829 acres purchased free and clear by the N.C. Wildlife Resources Commission for management as a game land. Together with nearby property owned by the state agriculture department, the South Mountains Game Land now totals more than 24,000 acres. And combined with contiguous pieces of public land in the South Mountains, more than 35,000 acres of prime hardwood forest have been protected in perpetuity for the people of North Carolina.

Surely that was the reason behind the hilarity and good cheer of the gathering, that and the overwhelming odds against the project's success in the first place. It was a David and Goliath story—the Foothills Conservancy, with its two full-time staff members operating out of a small Morganton office, competing against boardrooms full of suits. Declared dead any number of times, the project seemingly had more lives than a cat. Something always brought it back, whether it was an anonymous donation of $1 million that jump-started the fund-raising efforts, or the passage of the Clean Water Management Trust Fund. The Fund's timely grant of $4.2 million, more than anything else, clinched the property's purchase.

Serendipity, pure serendipity. Or was it? Perhaps fate was the word. The people just wouldn't let this initiative fail. They believed they they could do it. They believed they could buy a mountain.

So they did!

The interest in the Rollins Tract began as early as 1991, when the Joe Rollins Co. of Rutherfordton let it be known that it was interested in selling its land—more than 17,000 acres of mixed pine and hardwoods that form nearly 20 percent of the South Mountains. It was a prize. In the gneiss, schist and other metamorphic rock that underlay the pleasant swells of South Mountains' forests, a billion years of geological history are represented —heat that formed the rock, erosion that weathered it and formed the fertile valleys. The forests were large and diverse enough to shelter black bears, and other game species —large populations of white-tailed deer, gray squirrels, ruffed grouse, wild turkeys and raccoons—lived there as well.

The tract was important also because it contained 16 streams that form the headwaters of the First Broad River, an important source of drinking water for both Shelby and Cleveland County. Between 1828 and the mid-1900s, gold had been mined from deposits along Brindle, South Muddy, North Muddy and Silver creeks, and the First and Second Broad rivers. And several of the streams had a reputation for producing a different kind of gold—trout habitat. Henry River and Jacob Fork, on the state park side of the mountain, have long been meccas for trout anglers.

The plant life is unique for a different reason. "The South Mountains lie at a curious crossroads in nature," wrote botanist Bill Moye in his 1993 inventory of the flora. About 100,000 acres of forest sprawl over four foothills counties, ranging in elevations from 800 feet to nearly 3,000 feet. These elevational extremes bring unusual juxtapositions of coastal and mountain plant species, and southern and northern species. Other odd convergences include plants more at home in the Ozarks (yellow honeysuckle,

Lonicera flava) and midwestern prairies (rough blazing star, *Liatris aspera*); plants endemic to the Southern Appalachians; and state-listed plants such as Carolina saxifrage (*Saxifraga caroliniana*) and sweet pinesap (*Monotropsis odorata*). More than 300 vascular plants have been found on the Rollins property, 22 of them considered rare by the state. The state's Natural Heritage Program ranks the site as "nationally significant."

"But there are still lots of question marks," Moye said. He had spent years exploring South Mountains, first as a teenager and then as a botanist, trying to chart what he knew to be its treasures. Despite his years there, he admits that he still has a lot to learn.

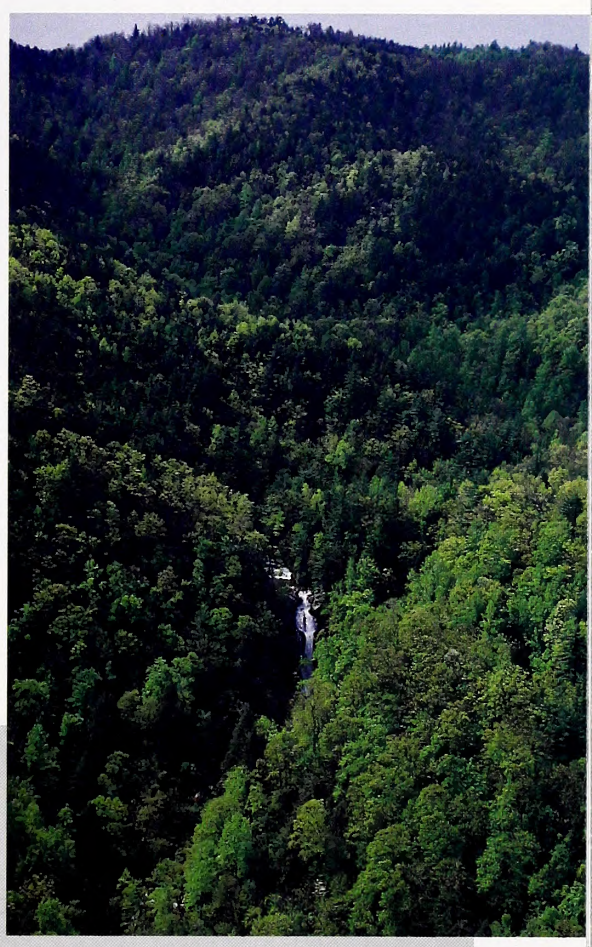
The owners had done very little with the land over the years, so the forests were in remarkably good shape. If a state agency purchased the land and helped protect the 35,000-acre core of South Mountains, why that would be something, wouldn't it? The prospect galvanized a group of people in the region, and they formed the South Mountains Coalition to push the project forward.

"The group's purpose was to save Rollins, pure and simple," says Susie Hamrick Jones, one of the original members. "We had our first meeting in the fall of 1995. Over 100 people came, including representatives from state parks and the Wildlife Commission."

The question was, who would buy the tract? The Parks and Recreation representatives declined, because their hands were full. They were in the process of acquiring the lands belonging to the Morganton watershed, which lay adjacent to the Rollins Tract. (Their purchase of the tract in 1995 almost doubled the size of the South Mountains State Park.) Would the Wildlife Commission be interested?

The Wildlife Commission was interested in such a prize, to be sure, but the price tag was staggering: $8 million at that time. Such a price "would tie up our only funding source for this type of property for several years," wrote Wildlife Commission land coordinator George Smith in an October 1995 report to the Commission.

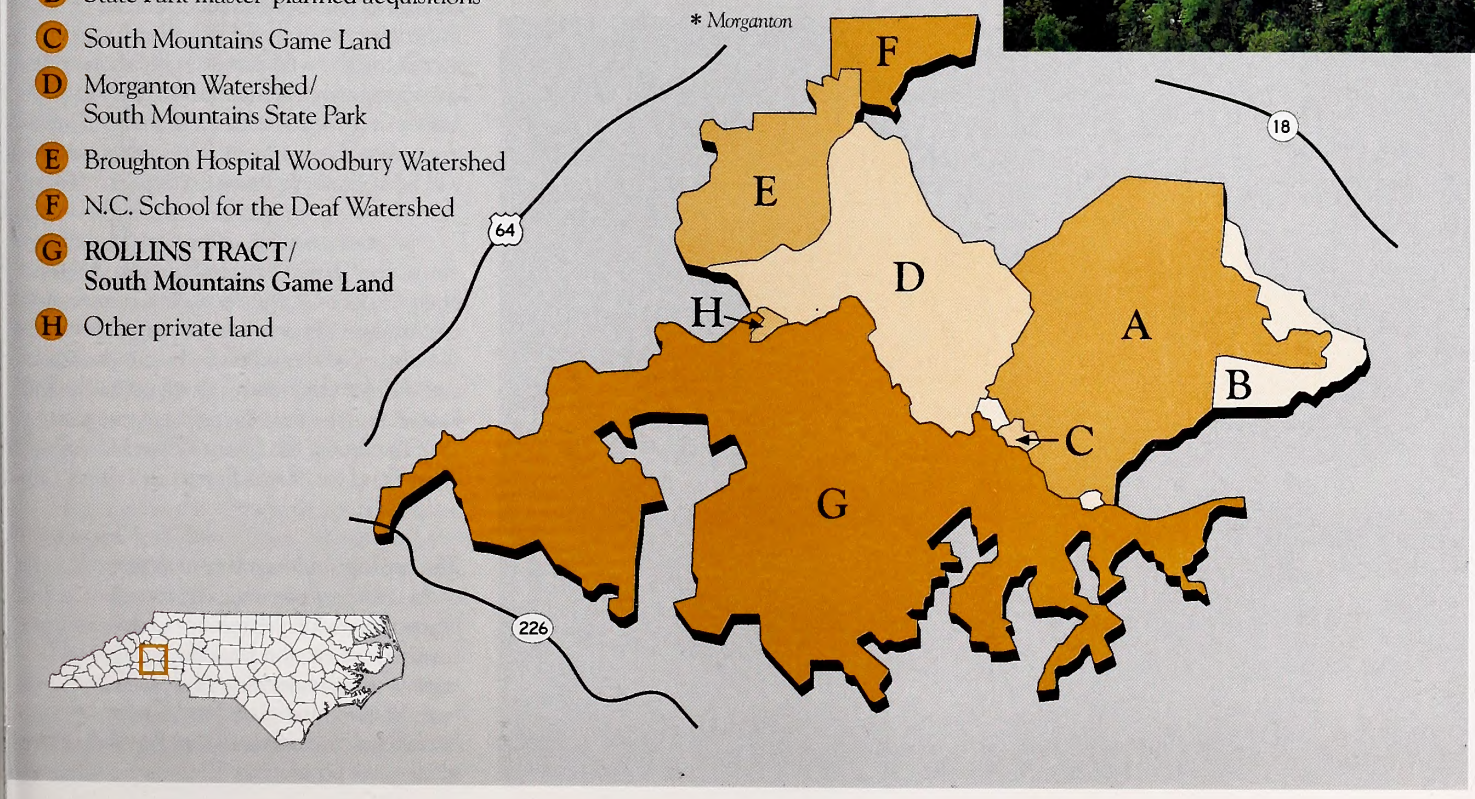
But the South Mountains Coalition would not be deterred. Members got in



***The 17,829-acre** Rollins Tract was one of the largest land acquisitions ever made by the Wildlife Commission. The game land falls mainly on one side of the ridge divide, while South Mountains State Park, partially shown in the photo, lies on the other. Together the publicly owned lands in the South Mountains make up about 35,000 acres.*

THE SOUTH MOUNTAIN PUZZLE

- A South Mountains State Park
- B State Park master-planned acquisitions
- C South Mountains Game Land
- D Morganton Watershed/ South Mountains State Park
- E Broughton Hospital Woodbury Watershed
- F N.C. School for the Deaf Watershed
- G **ROLLINS TRACT/ South Mountains Game Land**
- H Other private land



touch with the North Carolina chapter of The Nature Conservancy, which has a long history of brokering successful deals between willing sellers and public agencies, including many deals for the Wildlife Commission. The Conservancy agreed that the land was of critical value, but the organization urged the coalition's members to put pressure on the Wildlife Commission. Susie Hamrick Jones made a critical contact when she met with John Parks in 1995. At the time, Parks was the District 8 wildlife commissioner. Parks agreed to champion the cause.

"I pushed it through the Wildlife Commission because South Mountains was in my district," Parks recalled. "Its purchase just made sense and was worthy of support by sportsmen throughout the state. It'll benefit the hunters, especially in this area. It would have been a tragedy if we had not been able to get this property. I was convinced then, and I'm more convinced today, that if we had not been able to do this, over time every tree and every bush on this property would have been cut."

Parks's sense of urgency was justified. In the spring of 1996, the Rollins Tract had been sold to the McDonald Investment Group, a Birmingham, Ala., investment company. The Nature Conservancy's Merrill Lynch immediately began negotiations with the company that spring to acquire the property, but he found that McDonald was unresponsive to most of the inducements that he brought to the table. The group wasn't interested in conservation easements, donations, bargain sales or any of the other sweeteners the conservancy usually uses to nudge a deal along. McDonald was willing to sell, but the price of the property had escalated to an astounding $18 million.

More than once, Lynch woke up in the middle of the night wondering how the gap between the company's position and his was ever going to narrow. Worse, the company had already begun selling timber on the tract to pay the interest on its debt. There was a clock ticking, and Lynch knew it.

"I was worried about reaching the breaking point at some point," Lynch said. "If they cut too much timber, would the Wildlife Commission lose interest in acquiring the property?" Indeed, before the deal was clinched in the fall of 1997, McDonald would sell the timber rights on about 2,400 acres of the 17,000-acre property.

Partly in response to Parks's efforts, the Wildlife Commission had approved the purchase of the property in its long-range acquisition plans in the spring of 1996. With the Wildlife Commission's agreement in hand, the Nature Conservancy and the coalition—now reorganized as a nonprofit land trust called the Foothills Conservancy of North Carolina—could begin to raise the necessary capital.

And money began to show up—piles of it. A total of $2 million from the Natural Heritage Trust Fund; a $4.2 million grant from the Clean Water Management Trust Fund in the summer of 1997; the General Assembly's award of $5 million; $1.15 million from the Wildlife Commission's Endowment Fund; and $1.45 million in private funds pledged by the Foothills Conservancy. These pieces of the funding puzzle were finally joined to meet the $13.4 million purchase price, a rock-bottom price that Lynch had been able to negotiate because of the loss of value of the timber sale areas. (Actually, $13.8 million was raised; the extra $400,000 went to pay the expenses associated with the sale.)

On April 1 and 2, 1998, The Nature Conservancy made the purchase and on April 3 it had sold the property to the Wildlife Resources Commission.

With the acquisition of the Rollins Tract, the Wildlife Commission has been handed a challenge as well as an opportunity. A fully fleshed-out management plan will not be in effect for some time, according to Don Hayes, the future management biologist for the South Mountains Game Land. The plan will be developed by Wildlife Commission staff with input from citizens and local governments.

"Our initial management goals will be reforestation and posting boundaries," he said. Timber harvest as a result of timber sales negotiated by McDonald before the sale—the largest will amount to about 1,000 acres—have already begun, but Hayes sees opportunities even there. "Opportunities for hunting small-game species such as rabbit and quail are limited right now on the property because of the lack of early-successional habitat," he said. "We'll take advantage of the timber harvests that are now going on, even though they are much larger than we recommend."

White-tailed deer populations are plentiful and offer much needed hunting opportunities in the foothills section of the state. Future management objectives include increasing the wild turkey population and enhancing existing wildlife and fisheries populations and their associated habitats. Hayes notes that the entire 24,000-acre game land will be open for hunting on Sept. 1, 1998.

"It's not an easy task to get $5 million out of the General Assembly," joked Susie Hamrick Jones at the Foothills Conservancy's celebration. She was ecstatic as she reviewed the history of the purchase to her audience and thanked the many partners who had helped put the funding package together.

"The role of the Clean Water Management Trust Fund grant was absolutely critical," she

***This spring salamander** is only one of the wildlife species that visitors may find on the South Mountains Game Land. There are also huntable populations of white-tailed deer and black bear. Management goals for the game land include increasing wild turkey and small-game populations.*

In April 1998, the purchase of the Rollins Tract was formally announced. Among those present at the dedication were (left to right) Dick Hamilton, assistant director of the N.C. Wildlife Resources Commission; Katherine Skinner, executive director of the North Carolina chapter of The Nature Conservancy; Merrill Lynch, assistant director for protection of the North Carolina chapter of The Nature Conservancy; Jim Bennett, chairman of the N.C. Wildlife Resources Commission; and Susan Hamrick Jones, executive director of the Foothills Conservancy of North Carolina.

had said earlier (see "Trusts Confer Conservation Clout"). "It was clear that the Rollins project fit the criteria for this award because it holds 90 to 95 percent of the headwaters of the First Broad River. It's pristine headwaters."

She admitted that there was a lot of luck involved as well. It was the Trust Fund's first year of existence, and the Rollins project was the only land-acquisition project that year that had been fully prepared. "Our proposal was so thorough because we had been working on it for four years," Hamrick Jones said.

"One of the main stories that emerges from this is the power of partnership," she said. "The Wildlife Commission couldn't do this project by itself; The Nature Conservancy couldn't do it by itself; and we couldn't either. We all needed each other. And that's going to be the lesson for a lot of other projects in the state where you've got significant levels of cost. You've got to have partnerships in place."

The Foothills die-hards applauded a long roll call of their heroes. Bill Moye got a tumultuous hand for his years of lonely work inventorying the South Mountain flora, which uncovered the special nature of their backyard mountain. Jones recognized the Stanbacks, Fred and Alice, until then the anonymous donors of last spring's $1 million gift. Merrill Lynch stood for a cheer. Rep. John Weatherly stood next, followed by Sen. Walter Dalton, both of whom helped shepherd the project through the General Assembly. The list was long and the afternoon was hot, but no one complained.

"This partnership made this accomplishment possible," Dalton said. "It's an investment that will gain in value through the years, and as long as we live, we can be proud of acquiring this land to go in public ownership."

The applause floated out of the striped tent, over the meadow where the festivities were being held, and gathered beneath the green swells of the South Mountains that rose all around us. ⊠

TRUSTS CONFER CONSERVATION CLOUT

If the amount of public money involved in the acquisition of the Rollins Tract seems surprisingly large, it is. State agencies have never before had so much money to fund worthy conservation projects. The force behind this new-found financial clout derives largely from two public funding sources—the Natural Heritage Trust Fund and the Clean Water Management Trust Fund.

Natural Heritage Trust Fund

In 1987, state Sens. Lura Tally and Marc Basnight sponsored a bill in the N.C. General Assembly that established this fund to acquire and protect important natural areas, preserve the state's ecological diversity and cultural heritage and inventory natural heritage resources of the state. The trust was funded in 1989 by a portion of the sales of personalized license plates plus 25 percent of the deed stamp tax, which is levied on the sale of land and property.

Since then, the fund has dispersed more than $40 million to a variety of state agencies to protect more than 114 natural areas across the state representing 82,277 acres. Since 1987, the Wildlife Resources Commission has been awarded $12.3 million, which was used not only in the South Mountains Game Land purchase, but in previous acquisitions of the Green River Game Land, Gull Rock Game Land, Bull Neck Swamp and Roan Island. (See "Treasures in Trust," July 1997.)

Clean Water Management Trust Fund

Sen. Basnight also played a major role in the passage of another public trust when, under his sponsorship, the Clean Water Management Trust Fund was passed in 1996. The fund consists of 6.5 percent of the money remaining in the state's General Fund at the end of each fiscal year. In 1997, the trust netted $47 million for conservation purposes.

The purpose of the fund is to provide financial backing for projects that will help clean up the rivers and creeks of the state. These projects include acquiring land for riparian buffers; purchasing conservation easements; restoring degraded lands; repairing failing waste treatment systems; improving stormwater controls and similar measures.

Though these trusts confer millions of dollars each year, conservation needs continue to outstrip the financial means. Even so, these awards are enabling conservationists for the first time to compete successfully with other land uses, especially at a time when land values in North Carolina are skyrocketing.

Flies in the SALT

With fly tackle strong enough to subdue even a bluefin tuna, today's saltwater angler has more options than ever before. This veteran coastal fisherman tells you where to go, what to catch and how.

written and photographed by
Joel Arrington ©1998

Flotillas of fly-anglers gather at Cape Lookout in the fall to fish for false albacore, and over inshore wrecks in the spring looking for Atlantic bonito. Waders stand waist-deep in eastern Pamlico Sound, stripping flies for flounder and bluefish. Professional guides specializing in fly-fishing from small boats may be engaged for striped bass at Oregon Inlet and for red drum and speckled trout at Cape Fear. Five years ago, you would have been hard-pressed to find a saltwater fly-fishing guide in North Carolina.

Anywhere along our coast these days, the sight of someone working a fly line is no longer unusual. Figures are hard to come by, but recent years have clearly brought increased fly-fishing to North Carolina's brackish and salt waters.

This expansion of a fishing method that was practiced here by only a few people 25 years ago can be explained partially by the restoration of coastal striped bass populations. Effective management improved the Albemarle Sound striper population and increased the numbers of northern striped bass that migrate as far south as Cape Hatteras in winter. But fly-fishing has also increased nationally, as evidenced by two new exclusively saltwater fly-fishing magazines. For at least 10 years, retailers say, fly-fishing equipment sales have made up the fastest-growing segment of the angling market.

Good opportunity to put that equipment

to use has long existed in coastal North Carolina. In 1981, Chico Fernandez caught a 42-pound, 5-ounce red drum on a 12-pound class tippet at Oregon Inlet. It remains the largest red drum on the International Game Fish Association's fly record list. More than 10 years after Doug Hinson caught a 19-pound, 12-ounce bluefish from the Nags Head surf on a fly, it is still the largest of that species on the IGFA list. In 1995, Hinson added a 39-pound, 4-ounce red drum on a 20-pound class tippet. Mr. and Mrs. William B. DuVal of Virginia each hold numbers of records, many set in North Carolina, including every black sea bass fly record on the IGFA's 1997 list. The largest documented North Carolina fish caught on a fly is a bluefin tuna that Michael Reid of Maryland boated off Hatteras in 1996. It weighed 128 pounds. The leader was 20-pound class, the heaviest permitted under IGFA rules.

It was not your father's bream rod that subdued the big tuna. Modern fly tackle is more capable than most anglers 25 years ago imagined it could be. Some of it, like Reid's must have been, is optimized for playing strong fish rather than for casting a fly. But veteran flycaster and tackle expert Buzz Bryson says two rods—an 8- and a 10-weight—will cover most of the salty species and fishing conditions anglers encounter here.

"No one needs a lot of equipment," Bryson said, "unless they also want to fish for the big offshore species."

***There are few more** breathtaking fly-fishing experiences than standing in a piece of nervous salt water and making that first cast. With the bait fish schooling all around, you never know what larger fish might be lurking beneath the surface ready to pounce on a well-placed fly.*

Fly-anglers prefer a prey they can see before the cast, but will settle for fish that they have to "dredge" from the bottom. That means casting a sinking line and working a fly deep, certainly out of sight, often in murky water. But every fishery is different. Here are the prospects.

***Though few Tar Heel** anglers practiced the art of casting flies to saltwater species 20 years ago, there were a few visionaries who recognized the potential of the long rod in the salt. This handcrafted Seamaster reel proved a fine match for an 8-weight rod and the large speckled trout that were once common along the North Carolina coast.*

Atlantic Bonito

If warm weather comes early, the fish might show up in March south of Cape Lookout. More often it's into April; usually by the end of the month they have migrated out of nearshore waters. Often bonito gather over structure, like the artificial reef off Wrightsville Beach, or over wrecks.

Capt. Tyler Stone, owner of The Intracoastal Angler tackle shop at Wilmington and a professional guide, one morning last year fished a Thibault Baitfish on a 9-weight rod, but he admits that almost any small minnow imitation would work. Stone said the usual method is to set up a drift over a spot where you have marked fish or where they are showing on the surface. You may cast a sinking line ahead of the drift, so that you are above the line or a little past it when you begin a vertical retrieve. Often the bonito hit, he said, as the fly comes off the bottom.

His 350-grain sinking head took the lure deep. Then he stripped in long, fast pulls, hooking up on the first cast. The fish weighed only about 3 pounds, a bit smaller than the usual run, but it was strong and fast. A floating line works well when fish are chasing bait on the surface, Stone said, and it's more fun to fish.

False Albacore

Anglers now come from all over the country to converge on Harkers Island in November, when false albacore (little tunny) run at Cape Lookout. But all North Carolina inlets can attract albacore when schools of bait are migrating out of them in the fall. Although similar in body type to bonito, false albacore tend to run larger—usually 10 to 15 pounds, with a few exceeding 15 pounds.

Veteran fly-angler Tom Earnhardt, who has considerable tropical flats fishing experience, is sold on Fat Alberts. "I am convinced that albacore caught in shallow water are much stronger and half again as fast as any bonefish," he said.

Earnhardt recommends a 10-weight rod and prefers floating lines. He uses 10- to 12-foot leaders tapering to 12-pound test and ties flies directly to the tippet. Most flies for albacore are tied on No. 4 to 1/0 hooks.

"Proven winners," he said, "include sparsely dressed Deceivers, the epoxy-body Surf Candies and Clouser Minnows tied with bucktail." But he stressed that presentation is more important than pattern.

Albacore gather in schools, pushing small bait to the surface. Usually flocks of seabirds work overhead.

"For albacore to see the fly," Earnhardt said, "you must put it in front of or in the midst of a feeding pod of fish. Whether flies are moved as fast as possible or in a series of short, erratic jerks depends on the day and the feeding mood of the fish."

You need a "tarpon class" reel, Earnhardt said, one with a good drag and capacity for 250 yards of backing—the braided line behind the fly line.

Most anglers bend hook barbs to make releasing albacore easier.

Bluefish

Small bluefish often cooperate with fly-anglers. You find them often around structure and inlet shoals. Usually skipping bugs work better than streamer flies, but the toothy blues tend to destroy bugs quickly. Flies tied with synthetic hair and epoxy hold up well to toothy fish like bluefish and Spanish mackerel.

Big bluefish often behave just like the small ones but can weigh upwards of 20 pounds. They will be a handful even on a 10-weight rod. In the surf, a sinking line works better than a floating one, but usually you will want the latter when you're casting from a boat to a school that has pushed bait to the surface.

For bluefish up to about 15 inches in length, a hard monofilament leader of

Gear Tips and GUIDES

A quick look at equipment and guides for the North Carolina coast.

Tackle for Tar Heel Species

Quality gear is now available at lower prices. That's one of the benefits of the increased interest in saltwater fly-fishing, equipment guru Buzz Bryson points out.

Though it's still easy to spend $1,000 or more on a high-end fly rod and a machined reel, a quality outfit that will stand up to most saltwater fishing can be had for a third of that amount. In fact, Bryson says, these moderately priced outfits are of better quality than the premium outfits of a few years ago.

Novices may want to use a guide's equipment and quiz him or her on what to purchase, but two rods will be adequate for all but the largest North Carolina species. An 8-weight rod many anglers already own for largemouth bass will serve for speckled trout, small striped bass, red drum, mackerel and bluefish. And a 10-weight will be good for large stripers, drum and bluefish, for false albacore and bonito, and for smaller species when you want to fish in high wind. Only some tuna and large amberjack will exceed the capability of a modern 10-weight rod.

A click-drag reel will be adequate for the 8-weight rod, but the 10-weight should carry a premium reel with a quality drag and capacity for 250 yards of 30-pound-test backing.

You will need floating, intermediate and sinking fly lines, depending on conditions.

Most species can be caught on Clouser Minnow, Bend-Back and Deceiver patterns tied on No. 1 to 4/0 hooks.

Saltwater Guides

If you're new to saltwater fly-fishing, it's best to start with a guide or at least an experienced friend. In addition to having the tackle and the boat—frequently a necessity—they can also help with casting, the part most newcomers find most different and frustrating. Learning to cast 60 feet or more isn't difficult, but it does take practice. If you wait until you go fishing to learn the fundamentals, both you and the guide are likely to become frustrated.

Scott Austin, Aurora. (252) 322-5542
George Beckwith, Oriental. (252) 249-3101
Zander Brody, Buxton. (252) 995-5269
Gordon Churchill, Raleigh. (919) 552-6759
Steve Coulter, Hatteras. (800) 368-0807
Bryan DeHart, Manteo. (252) 473-1575
Al Edwards, Wilmington. (910) 452-0850
Sarah Gardner, Nags Head. (252) 449-2251
Brian Horsley, Nags Head. (252) 449-0562
Lee Parsons, Wilmington. (910) 256-2060
Rob Pasfield, Harkers Island. (252) 728-3907
Sam Sellers, Beaufort. (252) 728-3735
Tyler Stone, Wilmington. (888) 325-4285

***Saltwater fly-fishing** is becoming more affordable and popular as evidenced by the explosive growth in guides and tackle along the Tar Heel coast. One of the most versatile fly patterns available, the Clouser Minnow (left), can be used to take a myriad of marine species including the Atlantic bonito (below).*

30- or 40-pound test usually will hold together for several fish before one bites through it. You even have a chance to catch a giant bluefish on a mono leader of 150-pound test and up, but in most conditions blues are not shy of wire, so why not use it?

Flashy flies tied on 4/0 hooks to imitate a 6-inch bait are none too big if you can cast them. Sailfish poppers chugged over submerged wrecks work well, too.

Striped Bass

Probably more small striped bass have been caught on flies in North Carolina in the last two years than in the previous 20. Albemarle Sound is full of them. Every bridge from Oregon Inlet to Edenton probably has fish around the pilings at some time of the year. Chuck Laughridge works streamers and poppers around the fenders at the Manns Harbor Bridge over Croatan Sound on fall days and releases numbers of fish less than 18 inches long.

To catch big striped bass you will need to tap into the ocean population. One location has been the shoals at Oregon Inlet, but conditions have been hazardous at times. Several boats have capsized, their occupants being rescued by other boaters. One angler drowned last year.

Capt. Brian Horsley reported that numbers of large stripers were caught on flies last winter from the beach north of Oregon Inlet. Capt. Bryan DeHart of Manteo says that to maximize opportunities, you need an ocean-capable boat to handle the inlet shoals and to run up the beach to locate fish when necessary. He looks for birds, then for fish rolling on the surface, and has his customers cast intermediate and sinking lines, depending on how deep the fish are holding. He recommends menhaden patterns 4 to 7 inches long on 4/0 hooks.

***Saltwater fly-fishing** has gained such popularity in North Carolina in the past few years that today you are as likely to find someone casting surface poppers for large bluefish (left) over offshore wrecks as you are to find anglers waist-deep in Pamlico Sound stripping flies for flounder (below). With the variety of species available to the fly-caster, it is unlikely the sport will diminish here anytime soon.*

Red Drum

Oregon Inlet, where Fernandez caught the record red drum in 1981, has not produced as well over the years as Ocracoke Inlet, one of the best locations for trophy red drum anywhere. When conditions are good, anglers can cast into schools of fish running from 20 to 50 pounds and more. Fast-sinking lines and flies have proven effective.

Smaller drum are available in shallow water in many locations throughout Pamlico Sound and elsewhere in the state's protected bays, but managers say the stock is overfished.

Dolphin

School dolphin often will follow a hooked fish to a boat in the Gulf Stream. They can be held there with chum while anglers cast flies. Dolphin put on as showy an aerial performance as you will get from any species.

At first they are quick to pounce on lures, but often dolphin lose interest, particularly during calm conditions on warm days. Fish you can attract to the boat frequently run under 5 pounds, so a light rod will work well, unless a big tackle-burner hanging unseen outside the school suddenly darts in to take your fly.

Many charter boats here will accommodate customers who want to "bail" dolphin, and mates who work on them are glad to help. But customers should clear in advance any plans to vary from a boat's routine.

Amberjack

Similarly, a charter boat may encounter schools of amberjack over wrecks and beside towers and other structure. Fish can be teased to within fly-casting distance with hookless popping plugs and live baits wired through the back and dipped overboard.

Often your first cast will be your best shot, as AJs have become cautious from steady fishing pressure. Be sure you are in a position to pull away from structure should you get a hook-up.

AJs under 50 pounds generally can be managed with a 10-weight rod, if you can arrange to hook one 100 yards or so from its home structure. Otherwise, they will almost always cut you off on submerged steel and often ruin a fly line.

Speckled Trout

Anywhere you find specks in less than 15 feet of water, which is the usual depth for the species, you can get a colorful streamer to the fish provided currents are not extreme.

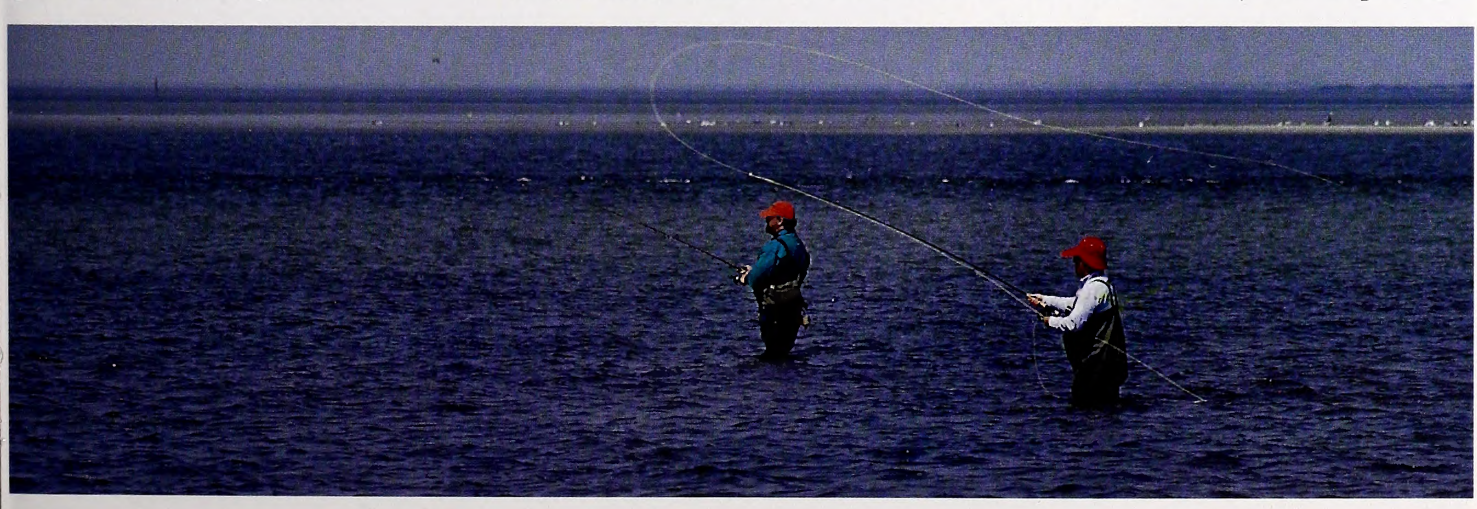
Use a sinking line and tie flies directly to 10-pound-test leader tippet, although occasionally you will lose one to a bluefish.

Spanish Mackerel

Capt. Rob Pasfield chums with a block of frozen glass minnows at Cape Lookout. He might fish a bright green Clouser Minnow trimmed to 3 inches or a Surf Candy streamer on a leader tapering to 12-pound test. He advises his clients to strip fast. In clear water, you don't want to give a fish long to look over a fly.

Frequent refusals may prompt you to drop to 10-pound test leader. Repeated cutoffs may require you to go up to 20.

Species still on the margin of the North Carolina fly-fisher's target include cobia, tuna and billfish. What the future holds, we must wait to see. But anglers and the fishing tackle industry remain bullish on saltwater fly-fishing. As the sport continues to expand, we can expect even more participation and more travelers to the Tar Heel coast, because the opportunity to fish flies here is likely to remain good. ⊠



F. EUGENE HESTER

Preserving a Southern Heritage

Hunting traditions are in danger in North Carolina as fewer boys and girls learn to hunt. That's why these organized youth hunts are so important.

written by Chris Powell

Visualize the following scenes: A bird dog locks on point, and a father confidently guides his son and daughter into position on a covey of quail. A grandfather, kneeling to inspect a buck scrape, shows his grandson where to set up a bow stand. With the sounds of a gobbler drawing nearer, an uncle demonstrates to his nephew the finer points of calling in a turkey.

Now imagine these scenes fading away.

Hunting traditions have been passed down through the generations ever since primitive humans learned to sharpen sticks and hurl stones. However, these traditions may be endangered as fewer boys and girls are offered the opportunity to hunt. Suburban upbringings, lack of available land, the impacts of television and video games are just some of the causes. And once the legacy is broken, it is rarely re-established. The number of hunters in North Carolina has remained level over the past few years—more than 200,000 in 1997. Still, there is cause for concern. Less than 3 percent of those in their teens or younger hunt in this state, according to U.S. Fish and Wildlife Service statistics. If these numbers don't rise, the sport likely will decline over the next 10 to 20 years—bad news for wildlife populations like white-tailed deer, now barely kept in check by hunters in some parts of the state. Overpopulation of deer can lead to poor herd health, crop loss and more encounters with another threat, the automobile.

KEN TAYLOR

***Proudly holding a** rabbit, this young fellow represents the future of hunting in North Carolina. If more youths are not exposed to the sport through organized or individual efforts, the heritage could be lost. Vance D. Gibson, an enforcement officer with the N.C. Wildlife Resources Commission (above right), demonstrates proper firearm handling to Curt Tigges, 10, of Asheville, during this year's Youth Hunter Conservation Education Field Day.*

The trend toward less hunting is not taken lightly by Scott Osborne, big-game coordinator with the N.C. Wildlife Resources Commission. "For us to effectively manage our deer herd and keep harvest levels compatible with biological and social capacity, we have got to continue to recruit more deer hunters," Osborne said.

The good news is that the N.C. Wildlife Resources Commission as well as a few private sporting groups are offering young people more opportunities to learn to hunt in an organized and educational setting. The Wildlife Commission's Division of Conservation Education has conducted the Belews Creek Youth Deer Hunt in cooperation with Duke Energy for the past 12 years. One of the longest-running events of its kind in the state, the hunt originated because of the need to offer hunting opportunities to youths, as well as to manage deer populations on a 700-acre tract of land near Belews Creek Lake, said Duke Energy's Mike Greene.

"We can't allow the general public to hunt on the land because of the safety factors," Greene said. "But having the Wildlife Commission manage the youth hunts provides a service to the community and reduces the likelihood of accidents."

Children ages 12 to 16 can apply for the hunt through the Wildlife Commission's computerized point-of-sale system available through license agents statewide. This year about 25 names will be chosen randomly for the hunt. For a child to qualify, the parent or guardian must have a hunting license and the child must have completed a hunter safety course. Once chosen, both participant and sponsor are required to attend an orientation on the first Saturday of October at Belews Creek, before hunting the following Saturday.

Wildlife Commission education specialist Tim Lemon, who supervises the event, said the orientation day provides an opportunity for the young hunters to review safety procedures, obtain valuable hunting information and familiarize themselves with the area. Participants receive an information packet that includes safety rules and past deer hunting articles from *Wildlife in North Carolina*. Dowd Bruton, with the Commission's Division of Wildlife Management, presents sessions on the characteristics and management of white-tailed deer, and Dale Mosteller, president of the N.C. Wildlife Federation, gives a presentation on general wildlife management activities taking place at the Belews Creek Station. Tree stand safety is demonstrated by a wildlife enforcement officer. Also, a conservation education specialist teaches participants how to navigate with the Global Positioning Satellite (GPS) system. Finally, a life-size, three-dimensional white-tailed deer model is used to demonstrate proper shot placement.

Following the instructional portion of the orientation day, participants receive a topographical map that depicts the different zones within the hunting area. The participants then randomly draw a zone and scout the area for three or four hours. Once a location is chosen, Wildlife Commission personnel pinpoint where each set of hunters will be, using a

KEN TAYLOR

KEN TAYLOR

***During this year's** Youth Hunter Conservation Education Field Day held in Hot Springs, gun safety was taught by wildlife enforcement officers. In addition to hunter safety and wildlife conservation activities, youths (left) were shown how bird dogs can be used to locate coveys of quail and grouse.*

GPS system. To increase safety, no rifles are allowed—only buckshot or shotgun slugs—and each child must be accompanied by a non-hunting adult. As a final precaution, Duke Energy's in-house emergency medical team is placed on standby. Hunting doesn't get any safer than at Belews Creek, which has a perfect track record, Lemon said.

On the following Saturday, the participants return for the actual still hunt which lasts the entire day. Hunters may choose to leave the site for lunch or pack a meal. Though most of the hunting is done from ground blinds, portable tree stands are allowed. Last season, 12 youths—six boys and six girls—participated in the hunt. The harvested deer were weighed, and the hunters and their adult guardians were shown how to age the deer.

One of the six boys who participated in last year's hunt was 15-year-old Jon Cole, of Gastonia. Out of three Belews Creek hunts, Jon has taken two deer, one of which was a six-point buck that still holds the record for the largest deer ever taken at the event. Needless to say, Jon likes hunting at Belews Creek. "The hunt organizers keep a limited number of people," Jon said. "It is an excellent program. If it weren't for the Belews Creek hunt, I wouldn't have my first deer. I am thankful." However, Jon did say he had one concern regarding the event—hunting with girls. "I was worried that the girls were going to outdo the guys, and I think that is excellent," he said. "My sister is planning on getting involved."

One of the girls in attendance last year was Erin McLaughlin, 13, of Winston-Salem. Though she didn't get a shot, Erin said she enjoyed the experience and would highly recommend it to her friends. "It was a lot of fun," she said. "There were about as many girls as guys and I was very surprised at that." Erin said her favorite part of the educational program was the shot-placement guide. "They use an artificial deer and tell you the best place to aim," she added.

Montana Philbrick, 14, of Bear Creek, who also attended the 1997 hunt, said he saw a couple of deer, but just couldn't get a shot. "It was a fun time to be there and have the hunts, and really if you didn't get to see deer there was still the wildlife," he said. "We saw a couple of turkeys, and it was an experience I really enjoyed."

While the educational programs are the main focus of the hunt, Lemon added that it is the look on children's faces after the hunt that really makes the day special. "If they have a good first experience, then it is an activity they may continue to enjoy," he said.

The education of young hunters is also the focus of the Youth Hunter Conservation Education Field Day, which is held each spring at the Pisgah National Forest, near Hot Springs in Madison County. The Wildlife Commission, in conjunction with the U.S. Forest Service and a host of other hunting-related sporting groups, has sponsored the event for the past two years. The event gives children an opportunity to learn about wildlife conservation programs as well as tree stand and firearms safety. This year, children were encouraged to participate in the Wildlife Commission Division of Conservation Education's "Oh Deer" activity, a segment of the N.C. Project WILD program. The activity uses a game of tag to teach the relationship between animals, predators and habitat.

In addition, the Enforcement Division conducted a canine demonstration that involved trained dogs sniffing out evidence like spent shell casings and hidden game. The children especially enjoyed the weapons safety event, which allowed them to fire shotguns while being supervised by a wildlife officer. Curt Tigges, 10, of Asheville, had never fired a weapon before he attended the field day. However, he said he felt completely at ease with a trained adult standing directly behind him. "I was nervous, but I felt a little calm too," Curt said. "I could do it again if I had an adult near me." Javier Begazo, 10, also of Asheville, said he had shot a gun before, but the activity made him feel even more at ease with the process. "They reminded me to stay calm, and keep the gun in a safe location and don't point it anywhere else," he said.

Other groups have also begun conducting youth hunts throughout the state. This year will mark the N.C. Wildlife Federation's fourth annual hunt for kids, which will be held in Bath at the Sniper Valley Hunt Club. No dates have been set. Federation members and nonmembers can apply for the free hunt by filling out an application found in the organization's magazine. Once 15 hunter-certified children are selected, they and their parents or guardians must attend an orientation the Friday before the hunt. The following Saturday, the pairs go to pre-selected stands, where they can hunt with either shotguns or rifles. During last year's hunt, six deer were taken including a nice six-pointer.

Dale Mosteller said another youth hunt is in the planning stages, and he would eventually like to see the Wildlife Federation sponsor a youth hunt at a different location every weekend of deer season. "The Wildlife Federation realizes that sportsmen are a dying breed, and we also realize that unless people like the Sniper Valley Hunt Club and the Wildlife Federation address the need, the sport of hunting is just going to go away."

Murphy Family Farms, based in Rose Hill, has also recognized the need for youth hunts. For the past two years, the corporation

F. EUGENE HESTER

In some families, *hunting is still considered a boy's rite of passage into manhood. A father taking his son hunting is the symbolic passing of the torch from one provider to the next.*

Young Hunters

F. EUGENE HESTER

What Young Hunters Need to Know

- People age 16 or older must have a license to hunt. Licenses can be purchased at most sporting goods stores statewide.
- All hunters, regardless of age, are required to complete a hunter safety course or have been previously licensed. For more information on where and when a course is offered in your area, call the Wildlife Enforcement Division at (919) 733-7191.
- State and county hunting regulations can vary year to year, so hunters must keep up to date. Copies of the *1998/99 North Carolina Hunting Regulations Digest* can be obtained from license agents or by writing: N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604.
- Blaze orange must be worn to hunt the following game with a firearm: bear, deer, wild boar, rabbit, squirrel, grouse, pheasant and quail.
- Permission must be obtained before hunting on private land.
- Youths should be familiar and proficient with a firearm or bow before hunting. To learn where a shooting range is in your area, contact your local gun dealer.
- Scout and familiarize yourself with the hunting area.
- If hunting in a tree stand, always use a safety harness.
- Make sure to have a flashlight for tracking wounded game or navigating in low-light conditions.
- Bring mosquito netting or insect spray and take precautions against ticks and chiggers.
- Hunt with a buddy and let someone know where you will be hunting.

has conducted special deer hunts on a 6,000-acre tract of land in Bladen County, near White Lake. This year, a disabled-adult hunt will be held Oct. 24, a youth hunt Nov. 7, a ladies hunt Nov. 21 and an underprivileged-youth hunt Dec. 5. Andy Adams, a Murphy Family Farms wildlife biologist who supervises the hunts, said the events are a way for the company to give back to the community.

"We would like to reach out to the kids who don't have any parents or just a single parent," Adams said. "We would like to get some minorities and kids from foster homes."

About 15 children are chosen for the youth hunt, with preference given to those with the least hunting experience. The first year Adams conducted the event, the only accommodations available were two 10-foot tents and a portable toilet. He advertised in local newspapers and barely attracted enough attendance. The hunts have proven so popular since then, the company has added a few improvements to the property—namely a 1,600-square-foot, fully furnished hunting lodge, "top-notch" skinning rack and a series of camouflaged ground-blinds with roofs.

The hunts are divided into morning and afternoon segments, with adult-child teams occupying each of the ground blinds. After a complimentary lunch, children receive training in firearms from a licensed instructor, a talk about hunting ethics from a local wildlife enforcement officer and information about deer management from Adams. Then, a B.B. gun tournament is held, with sharpshooters receiving a number of prizes.

Last year, volunteers were on hand to skin the harvested deer, and children were encouraged to participate. Any meat that wasn't taken home was donated to N.C. Hunters for the Hungry, Adams said.

On a more impromptu basis, the Wildlife Action Group of North Carolina sponsors hunting opportunities by matching youngsters with hunters who specialize in a particular quarry, said Greg Parker, president of Wildlife Action's Lumber River chapter. "We go squirrel hunting, rabbit hunting, deer hunting," Parker said. "Children could be involved with a goose hunt. We would accommodate them in some sort of way." Most of the events are free, but Parker said the cost for some outings may be a $30 membership to the Wildlife Action Group.

In addition, Wildlife Action's White Marsh chapter plans to sponsor a free youth dove hunt the first Saturday after the opening day of dove season. The dove hunts are generally held in the Whiteville area and can accommodate about 10 children between the ages of 10 and 18 (those below the age of 12 can participate but not hunt). "They would need to bring their guns and their shotgun shells, and in the event they didn't have a gun, they would need to let us know which gun they needed and bring their shells," Parker said.

Generally thought of as a gentleman's sport, duck hunting is an opportunity being made available to younger hunters at the Lake Mattamuskeet National Wildlife Refuge. A youth hunt is usually held on Thanksgiving weekend and another on the federal youth duck hunting day—typically the first Saturday after the close of the regular duck season. Between 15 and 20 hunter-certified youths are selected through a random drawing in October. The cost of the hunt is $12.50, which grants access to one of 16 blinds. Because the blinds can accommodate three people, one non-hunting adult usually supervises two children, said Don Temple, the refuge's manager.

The dividends from organized youth hunts are incalculable. Not only are children provided an experience of a lifetime, they also learn gun safety, fellowship and sportsmanship. But these organized hunts aren't the entire solution to a sport showing signs of decline. On an individual basis, hunters need to begin providing opportunities to children who would like to hunt but have no means. By taking a child on his or her first hunting trip, adult hunters can ensure that the tradition is passed to the next generation—the way it was always meant to be. ⊠

Youth Hunt contacts:

Belews Creek Youth Hunt—Tim Lemon, Wildlife Commission education specialist (336) 957-4382

N.C. Wildlife Federation—Dale Mosteller, president of the N.C. Wildlife Federation, (704) 875-4434 or (704) 735-4478; Lisa West, special projects coordinator, (919) 833-1923

Murphy Family Farms—Andy Adams, Murphy Family Farms wildlife biologist, (910) 289-2111 Ext. 4520

Wildlife Action Group of North Carolina—Greg Parker, president of the Lumber River chapter, (910) 642-7387

Lake Mattamuskeet National Wildlife Refuge—Don Temple, refuge manager, (252) 926-4021

The future of hunting *may be salvaged by our daughters as much as by our sons. One of the newest trends is an increasing number of girls and women who are becoming involved in hunting. Using a set of antlers,* Wildlife in North Carolina *photographer Ken Taylor (right) gives his daughter, Jessie, some pointers on rattling for bucks.*

BANKING TOMORROWS

His first hunt wasn't exactly what the boy had expected. But for the author, the experience was almost more than he could bear.

written by Mike Gaddis ©1998
illustrated by Chris Armstrong ©1998

"Take your time now, Russ, and s-q-u-e-e-z-e," I whispered softly to the 11-year-old drawing a bead on his first squirrel, hanging motionless by its hind paws in a shagbark hickory among leaves golden with October sunfall.

Even with the little .22's forearm resting on a sapling, its muzzle wobbled like a fawn on new-found legs. "Take a breath, Russ, let a little out, and hold it." The boy was struggling, with the gun and with himself and with the overpowering exhilaration that had come tumbling down in a heady swill through patrimonial bloodlines to capture his fiber and his being, and awaken him to what he was and was to be. I could feel it in the squinch of his face and the tremble in his fingers, and feel its kinship in my insides. My nose was burning and my vision was beginning to blur, and all the beautiful melodies of all the beautiful seasons were gathered into a prideful essence, and I too was a young hunter again, to the core, as my father had taught me to be. I had created the moment as he had created mine, and now Russ would re-create the memory.

The crack of the .22 split the prolonged tension like a comma of relief in an extended sentence, and just left of its target the tiny bullet splattered shards of bark against the leaves and whined away into oblivion. The squirrel side-slipped around the tree a few inches and renewed its hope of obscurity. "It's all right, Russ, try him again, you've still got a shot. Take your time and make it count." The boy settled into the stock once more, the fledgling beard on his face softly white in the sunlight, a full-grown determination pursing the corners of his mouth. I watched him pilot the bead into its harbor at the bottom of the notched sight, and navigate the barrel into alignment. I studied his small body as it fought the instability of its labored breathing, and began to win, began to relax, and his finger as it slowly tightened to the trigger. The sensation was strangely soothing, the feeling you get watching your portrait unfold on an artist's sketch pad. I was seeing myself, through my father's eyes, 40-odd years ago.

There was another diminutive crack and a hollow pop, and the squirrel instantly dropped limply into the arms of gravity, bouncing and somersaulting its way through the intervening limbs and plummeting to the ground. About the same moment, Russ was shaking off the binding shackles of disbelief,

split seconds before he vaulted into unbridled exuberance.

"I got 'im! I got 'im!" He was jumping up and down in cadence with his excitement. "I got 'im! I got 'im!," he repeated, again and again, deliriously.

"Yes, Russ, you sure did," I encouraged, laughing outside, smiling inside. "You made a great shot!" His face was flushed and his lip was quivering and he was making little whimpering sounds in his throat like a disoriented puppy. He scarcely heard me, but he saw my lips move and he knew their meaning. And then the tears flowed, tears of relief and attainment, joy and fright.

My nose was burning again. I was wondering what I had done to deserve this, what I had done to deserve so many exquisite gifts in my years outdoors. Each time the effect was the same, so utterly humbling, so beautifully fulfilling that for a time it seemed whatever remained of life could only be superficial. It hit me now, on the threshold of my sixties, as it had never before. I almost wished the option would be called, in that moment.

There was no time to contemplate the matter. Russ was off in a dash for the stricken squirrel.

"Whoa, boy!" I hollered. "Throw the safety on that gun." "I have," he implored with a painful inflection, turning and pausing momentarily, whining and prancing from one foot to the other like a fiery young pointer marking flight at the end of a check cord. "Never run with a loaded gun, Russ," I admonished. "You could fall and shoot yourself or ram the barrel in the dirt and have it blow up in your face next time you pull the trigger." He looked at me pitifully, and answered with a terse but obedient "Yes, sir." His dampened look wrung me out. He was a boy who'd just killed his first squirrel, the round in the chamber was spent, and the damn safety was on. It was no time for the curb bit. I might be old now, but I wasn't born that way. "Hell, boy," I smiled, "find your squirrel," and I broke into a jog beside him.

The squirrel was balled into the yellow leaves at the base of the hickory, a large boar with a beautiful gray coat sparkling with silver guard hairs and a full, bushy tail that looked as if it had been washed and blown dry. The bullet had taken him just behind one ear. There was a dark, ugly, matted spot there, with bright red splashes of fresh blood on the leaves. Beauty and death: How many times had I suffered the agony of that message, the piercing introspection caused by that link.

It hit Russ hard. He stood there silently for a long minute, staring and biting his lower lip, the rifle listing limply in one hand. A wet drop of remorse thumped the leaves, and then another and another. I let it be. I knew what he was feeling and I wanted to encourage it for a time. This world was crammed full of people, hunters and otherwise, heartless to life. Russ, I was determined, would not be one of them. The foremost doctrine of a hunter must be respect for the hunted. It is the only way he can justify the merits of his existence.

Presently, Russ turned to me with misty, sickened eyes. "I don't think I want to do this again," he stammered resolutely. I laid a light hand on his shoulder. "You will, Russ, not again today, or tomorrow, or maybe even the day after that. That's as it should be. But you will."

I kneeled and picked the squirrel up by a hind leg with one hand and laid it gently in the other. A tiny shaft of sunlight found its way through the leaf canopy and burnished the gray-brown jacket and brilliant white underbelly to a velveteen sheen. He was still soft and warm. I stroked and smoothed the hair with the back of two fingers, and teased the buoyant tail plumage. After a time, Russ reached out and gingerly did the same.

"We won't dwell on it right now, Russ," I said, "his dying. It's right to feel it and to think about it, but right now we're going to take him home and skin him out and afterwards I'll show you how to dry and work the skin, so you can hang it up or cover a knife sheath with it or something. Meantime, we'll look up Miss Loretta and get her to fry him up all nice and brown for our supper, and when we sit down to the table we'll think mostly about gentle October afternoons and hickory leaves the color of cured tobacco, and return a word of thanks for your squirrel and the privilege of being there together."

I stood and slowly started away. After a few steps, Russ stopped me. "Can I please carry him?" he asked meekly. "Yes, Russ, you surely can," I said. Ahead, somehow, the path blurred, and once more there was that stinging sensation climbing the bridge of my nose.

We sat quietly on the ridge, in the afterglow of the hunt, watching the blood orange fires on the horizon cremate the remains of the withering sun.

Melancholy was stealing up the hillside. After so many afternoons of so many years, its probing inquisition had become a rightful homage to the quest, a tithing of the soul within a sanctuary of bittersweet clarity. I encouraged it now, pledging the closing half hour of certain days to its arrival and demanding the same of my company.

On certain days fate graced the five decades of my sporting life with another tender favor, pressing for a proper thanks I could never seem to find. Today had been such a day, banked for me long ago by a loving parent.

"Thank you, Russ," I said spontaneously to the boy beside me.

He turned to me, momentarily, with a puzzled look, and I simply smiled and looked away. One day of his own making he would understand. ⊠

This world was crammed full of people, hunters and otherwise, heartless to life. Russ, I was determined, would not be one of them.

Why I Hunt with My Kids (and other tall tales)

Hunting with a son or daughter is sometimes less than it's cracked up to be.

written by Dale Caveny / illustrated by Jackie Pittman ©1998

Many outdoor writers have spun eloquent tales describing the joys of sharing the outdoors with children. They point out that we, as adults, can once again see common, overlooked things through the wide eyes of youngsters. We are encouraged to "take a kid fishing or hunting" and help protect the future of sporting by stirring youthful interests. Though I agree with this, the writers fail to mention that not every trip afield is picture-perfect.

A case in point was a squirrel hunt I went on this past season with my young daughter and son. I spent the better part of the morning imagining how an afternoon with my two children, Elizabeth and John, would be spent. I closed my eyes and visualized a beautiful hardwood ridge, the treetops filled with squirrels, and Elizabeth and John sitting quietly beside me. But as is usually the case, reality did not quite match fantasy.

Both children have hunted with me before. Elizabeth, who is 10 years old and rapidly approaching 20, has hunted deer with me for four years. She and I enjoy reading, so we each take a book and sit side by side reading on the stand. She has been on hunts when deer were killed and on hunts when we saw nothing. All were successful. She will sit quietly. John, however, is a different story.

At 7 years old, he is a true deer hunter. Either looking through binoculars trying to track down the source of the sound he just heard or sleeping on the stand, he feels the need to share all the things he sees or hears. Although he whispers, he talks steadily the whole trip. His good-natured ribbing at missed shots gives him the air of an experienced hunter and makes him popular around camp.

I met both at the door after the bus delivered them home from school the opening week of the squirrel season.

"How would y'all like to go squirrel hunting?" I asked, as they threw their bookbags across the floor.

"Yeah," they said in unison, followed quickly by, "Can we stop by the store for a snack?"

As they scrambled to their rooms to get dressed, I thought back to my childhood hunting trips with my daddy. Looking back, there were probably fewer of these trips than it now seems. More often than not, our hunts consisted of walking a hardwoods creek bottom for squirrels, or riding around until we found a rabbit hunt we could join. Regardless of where we hunted, almost every trip began with a stop at Mr. White's store.

Mr. White's was a whitewashed, cinder-block building that never seemed to have enough light bulbs to adequately light the interior. A layer of fine dust covered the slow-selling items. From the back room where Mr. White refinished furniture, the smell of polishes and finishes drifted through the open door. The heart of the store was an upright, coal-burning stove, where there were always three or four men gathered during the winter months. Standing in front of the stove, alternating sides to avoid burning my legs, I would sip a soft drink filled with peanuts and listen to the older men give advice on the best places to hunt. At the store, I was treated as an equal, until the day the soda pop crate I sat on tipped over. My early hunting memories are as much about sitting around that stove as actually hunting.

Rushing back down the stairs, Elizabeth and John were soon in a heated argument over who should rightfully wear the blaze-orange hat.

"Daddy, make Lizzy let me wear that hat," John pleaded.

"Where is your hat?" I asked.

"I don't know, I can't find it," he responded.

"What do you mean, you can't find it. It's orange. How hard is it to find an orange hat?"

"Daddy, stop fussing at me!" John yelled loudly. Sensing that he was walking on shaky ground, he softened his tone. "Can I wear your hat, Daddy? It's against the law for me to go hunting without wearing an orange hat, right?"

My frustration was building as I explained, "If you were carrying a gun you would have to wear hunter orange. But, you're not carrying a gun."

The news that he couldn't carry a gun was met by another loud protest.

"Fine, we'll just stay home," I finally said.

"No!" they screamed.

Soon we were out the door, in the truck,

"I closed my eyes and visualized a beautiful hardwood ridge, the treetops filled with squirrels, and Elizabeth and John sitting quietly beside me."

and on the way to the local store. Once there, the conflict continued.

"What can we get? Can we get a snack and a drink or just one or the other?" they asked.

Feeling indulgent I said, "Both."

"If I don't get a drink, can I get two candy bars? Or does it have to be a drink and a snack?"

Hoping for a trip that would call for no decisions or choices, I was forced to decide what they could have for snacks, knowing the choices would not be right.

"Just get something or do without," I snapped.

As we drove toward our hunt club, I felt the soft drink mingling with the acids my stomach had been producing from the week-long black powder season, which had been immediately followed by the opening week of bear season. These seasons wear out a wildlife officer both physically and emotionally. "Breathe deeply," I thought to myself.

We parked near an old logging deck, and I laid out our strategy for the hunt. "We'll go in the woods here and walk a little ways until we find a good spot to sit," I said.

Elizabeth and John both nodded in agreement, realizing that it wasn't a very complicated plan. "Let's try to be quiet as we walk in the woods," I added. Again, there were nods of agreement.

As a wildlife officer, I have observed that hunting means something different to almost everyone. I enjoy the solitude of being in the woods. Away from the ringing telephone, it is a time to simply be still. This seems to bring about a renewal of my senses, which are continually bombarded during the course of an average day. I see things more clearly in the woods; sounds are louder; smells are more intense. Difficult to describe, this is the very thing I want to share with my kids.

Although it had rained for two days, a light breeze and sunshine had quickly dried the leaves that had recently fallen. Sounding more like an army, we slowly crunched our way through the woods. I moved ahead of the kids, hoping to see a squirrel before all animals within a mile were aware of our location. As I walked ahead, I heard a commotion louder than I thought two kids were capable of making. Looking back, I saw both dragging newly found "walking sticks" that appeared to be 6 feet long. I had "shushed" them for the 10th time when they stopped suddenly and called out for me to come look at the deer tracks they had found. I walked back and John pointed to the tracks. Elizabeth remarked at their depth, concluding it must be a big one. I agreed and moved on ahead.

When we finally arrived at a small stand of white oaks, I found a suitable place and raked the leaves from a spot the size of a truck hood. I had learned from experience that the only way to keep a kid quiet was to sit him or her down on plain dirt. Sitting at the base of a medium-sized oak, I placed Elizabeth on my left side and John on my right. I asked them to sit quietly.

Less than a minute later, Elizabeth leaned over and asked if I had seen anything yet.

"Not yet," I replied.

"Let me know if you do," she said, turning back around.

Thirty seconds later, John whispered, "Have you seen anything yet?"

"Not yet," I replied.

"Let me know if you do," he said, turning around.

These questions continued back and forth until I finally forbade them to ask again.

"You don't have to be so grouchy," said a dejected John.

A few minutes later I heard a crunching sound coming from Elizabeth's side of the tree. I looked to see her dragging leaves back into the cleared circle with her walking stick.

"Sh-h!" I scolded.

"Sorry," she mouthed, without speaking.

John tapped me on the shoulder. "Look at this, Daddy. Now I've got a gun too."

He held up a stick that actually resembled a rifle.

"See, here's the barrel; here's the trigger and here's the scope. It's just like yours."

"Good," I said. "Now you watch that side, but be quiet."

"Okay."

John is blessed with creativity. His imagination knows no bounds. Elizabeth is more analytical. At times this causes clashes.

"John, let me see your gun," Elizabeth asked in a loud whisper.

Leaning around the back side of the tree, John showed her his stick. She quickly pointed out that it looked nothing like a gun, that it wasn't long enough.

"Well, we think it does, don't we, Daddy?"

To emphasize his point, he began shooting imaginary squirrels from the tree tops. As he got louder and louder and my stomach burned hotter and hotter, I decided it was time to move.

"Come on, let's walk," I barked at them.

"Good," said Elizabeth. "I was getting tired of sitting."

"Yeah, this is not a good place, anyhow," John added.

We started through the woods. John shot everything in sight, both real and imaginary. And Elizabeth continued to drag her noisy walking stick.

I thought that if we couldn't squirrel hunt, I could do a little deer scouting. We walked past a ladder stand, and John immediately wanted to hunt from there.

"No," I said.

"Why?"

"Because."

"Because why?"

"Just because."

"Rushing back down the stairs, Elizabeth and John were soon in a heated argument over who should rightfully wear the blaze-orange hat."

I hated to admit to John that 12 years of enforcing game laws have left me quite cynical, and that if I saw someone sitting in a deer stand with a .22 Magnum, I would have a lot of serious questions.

"Just because why?" he insisted.

"Because there's not room for all three of us."

"And we don't have a safety belt," Elizabeth added.

John said, "Oh" and continued his hunt, as Elizabeth smugly dragged her walking stick.

We meandered through the woods for 45 minutes. I pointed out deer droppings, turkey scratchings and cut hickory nuts left by squirrels—proof there actually were squirrels in these woods.

Looking ahead, I saw a squirrel jump from a log and run up a tree. I motioned for the kids to stop and be quiet. I pointed, and both knew what I had seen. Approaching the tree from the far side in a slow semi-circle, I saw the squirrel watching the kids. I shot and it fell.

John came running. "Daddy, can I get it?"

"Watch it for a second, it could still bite you," I warned.

John nudged the squirrel with his walking stick and, satisfied it was dead, picked it up by the tail.

"Daddy, come look at this."

Elizabeth and I walked over to John.

"Look at this, Daddy," he said, excited at his discovery. "It fell right it a pile of poop. Do you think the poop was already here, or did it poop after it hit the ground?"

"John," Elizabeth said, "how could something dead poop? And even if it could, how would the squirrel end up on top of it?"

"Maybe it pooped on its way down, and the poop landed first. You don't know everything," he responded.

"I know that looks like deer poop, and there's way too much to have come from that squirrel, right Daddy?"

"I think you're probably right, Elizabeth."

She smiled proudly and triumphantly walked away dragging her walking stick.

"You know, Daddy," John said, solemnly as he looked at the squirrel, "it's pretty bad luck to get shot and then fall in a pile of poop."

I had to agree.

Elizabeth considered the hunt over, although there was still an hour of daylight left. She decided to stay at the truck while John and I hunted one other small block of hardwoods.

As the shadows grew longer, the squirrels became more active. Sitting on a log beside me, John saw a squirrel 75 yards away. I watched it through the scope, debating whether or not to try the shot. As I followed it with the scope, it stopped on a log, and I decided to shoot. I took a deep breath and slowly exhaled halfway, just as I have instructed many times. I slowly applied pressure on the trigger, waiting for the shot to surprise me. Before the gun fired, John tapped me on the shoulder and said, "Let me know before you shoot, so I can cover my ears." I nodded and when I looked back, the squirrel was gone.

" Before the gun fired, John tapped me on the shoulder and said, 'Let me know before you shoot, so I can cover my ears.'"

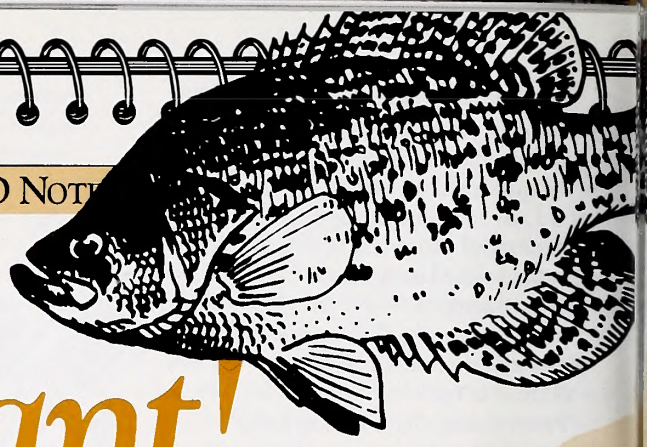
We shot three more before heading back to the truck where Elizabeth waited. John proudly held the squirrels up by their tails and pointed out to Elizabeth that one still had an acorn in its mouth.

The mood was lighter as we rode back home. I noticed that my stomach no longer burned. John made fun of my missed shots, and they once again debated various poop theories. Back home, John insisted that he should carry the squirrels from the truck and show them to his mother. He pointed out the acorn still in one's mouth, and that two were male and the others female. The children brought out pans to help with the cleaning, both asking if we could have squirrel dumplings for Thanksgiving. We were almost finished when they asked if they could go inside to play with their new guinea pig. I told them I would finish up.

After cleaning the squirrels, I washed my hands and rinsed them one more time. Stopping on the back porch, I heard John telling his mom how the squirrel had pooped after it was shot, and Elizabeth protesting that the poop was already there.

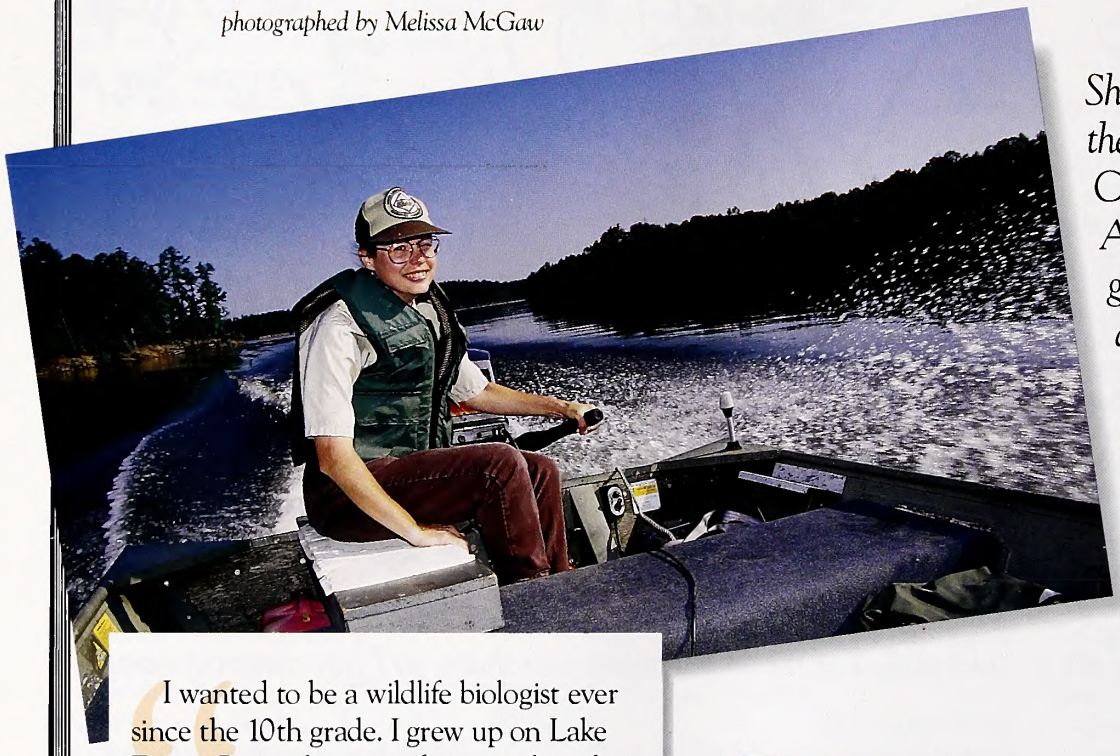
Maybe those writers are right. It is refreshing and humbling to view the world occasionally through a child's eyes. It is good to give a child the memory of a squirrel still clutching an acorn or falling in a pile of deer droppings. There's something else about hunting with a child. But right now, I can't remember what it is. ☒

Dale Caveny is a wildlife enforcement officer with the N.C. Wildlife Resources Commission.



Meet FISHERIES BIOLOGIST Shari Bryant!

photographed by Melissa McGaw



Shari's been working with the N.C. Wildlife Resources Commission for 12 years. As a fisheries biologist, she gets to ride in boats, catch all kinds of fish, work with computers and do other neat stuff. But sometimes she has to do unpleasant things, too. For example, after a big pollution spill and a lot of fish die, she has to count the dead fish. Phew!

"I wanted to be a wildlife biologist ever since the 10th grade. I grew up on Lake Erie in Pennsylvania and spent a lot of time outdoors. I really enjoyed walking through the woods and identifying trees. When I went to high school I studied biology for the first time and I loved it. In college I was interested in working with wildlife, but then I switched to fish. I've been working with fish ever since."

recording data

Mostly my job is to make sure that the fish are healthy in the lakes and reservoirs in the Piedmont area of the state. Two of the fish species that I manage in North Carolina are called **crappies**. There are black crappies and white crappies. My job is to find out whether they are growing fast or slowly.

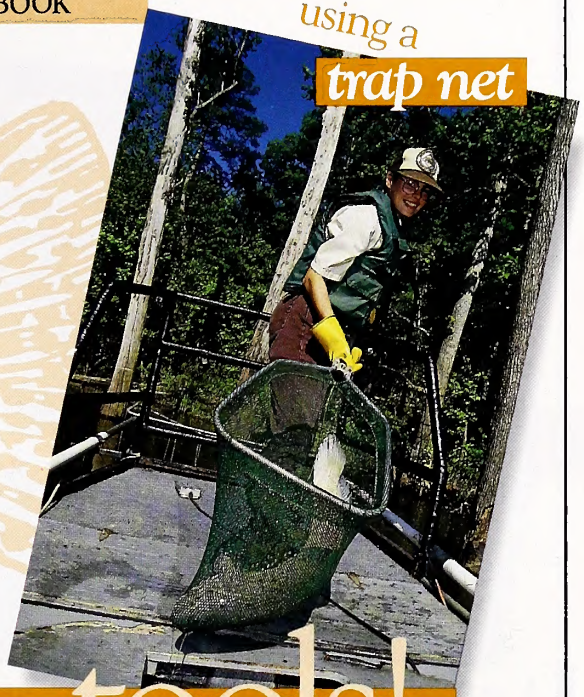
To do this, I first collect a sample of perhaps about 200 crappies. When I get a fish in the boat, I measure and weigh it. I also want to find out how old the fish is. Did you know you can sometimes tell how old a fish is by looking at a single fish scale? A more accurate way is to look at the fish's earbone—it's called an **otolith**—through a microscope. I can put an otolith under the microscope, count the number of rings on it and know precisely how old the fish is.

weighing a fish

If I do this over many months, I've got records of hundreds of fishes' lengths, weights and ages. These are important data. If we find that on a certain lake, lots of 8-inch crappies were 6 years old, we'd consider that a slow-growing population. It might mean that there were too many crappie in the lake for the amount of food. On the other hand, an 8-inch crappie that is 1 or 2 years old would indicate a fast-growing population.

When we know the age of the fish, and its length and weight, these data give us an idea of what we need to do to manage the fish. Data like these help us provide better fishing opportunities for anglers.

using a **trap net**



tools!

Here's a list of some of the tools I use with my job:

- *A motorboat. It's fun to drive a boat.*
- *Trap nets. That's to pull in the fish we capture.*
- *A measuring board (to measure fish).*
- *A couple of tubs (to fill with water to keep the fish alive).*
- *Measuring scales (to weigh the fish).*
- *A tool box and a lot of safety stuff like* **PFDs (personal flotation devices)**, *cushions, raingear and the like.*

measuring fish

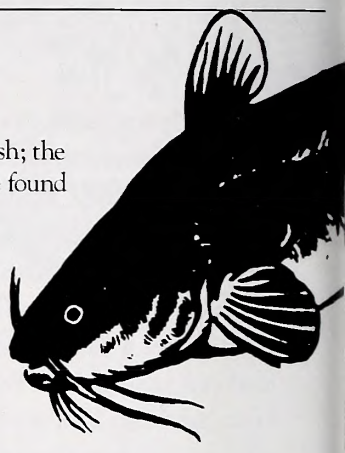
taking an **otolith**

taking a scale

largemouth bass

The number of fish in a pond depends upon the health of a **food chain**. At the bottom of the chain, there are microscopic plants called **phytoplankton**. Small aquatic insects eat the plants, and bluegills eat the insects. Other fish such as **largemouth bass** are predators that eat the insect-eating bluegills. That's one food chain.

If the density of phytoplankton decreases, there will eventually be less food for the bluegills. As a result, their numbers may decrease. When that happens, there will be less food for the largemouth bass and their numbers also may decrease. At some point, more food may become available for the bluegills and their populations may increase. That makes more food available for the largemouth bass and their populations may increase as well. This cycle can happen over and over and shows how predator and prey species affect each other.



What Does It Mean?

crappies: one of several types of panfish; the black crappie and white crappie are found in lakes and slow-moving streams

otolith: a part of the inner ear of fish that helps them hear and balance themselves in the water

personal flotation device (PFD): an inflatable life preserver worn in boats for safety

food chain: the system of feeding relationships in an ecosystem in which food energy is passed from plants to plant eaters (herbivores) to meat eaters (carnivores)

phytoplankton: microscopic aquatic plants

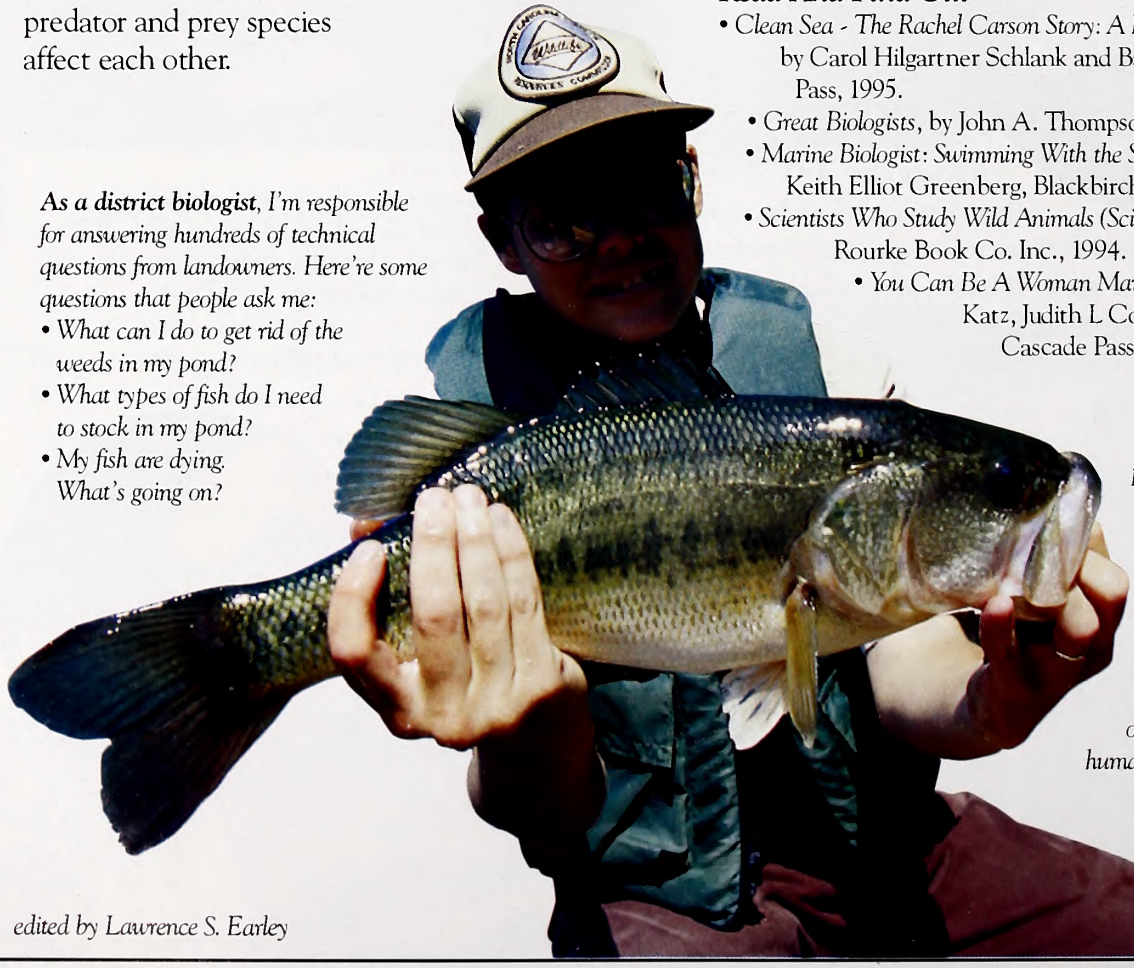
bluegill/bream: a common sunfish found in lakes and streams

largemouth bass: another type of sunfish that preys on crappies, bluegills and other smaller fish

Pfiesteria: a microscopic aquatic organism that kills fish and can harm humans

Read And Find Out

- *Clean Sea - The Rachel Carson Story: A Biography for Young Children*, by Carol Hilgartner Schlank and Barbara Metzger, Cascade Pass, 1995.
- *Great Biologists*, by John A. Thompson, Ayer Co. Publisher, 1932.
- *Marine Biologist: Swimming With the Sharks (Risky Business)*, by Keith Elliot Greenberg, Blackbirch Marketing, 1995.
- *Scientists Who Study Wild Animals (Scientists)*, Mel Higginson, The Rourke Book Co. Inc., 1994.
- *You Can Be A Woman Marine Biologist* (CD), David A. Katz, Judith L Cohen, Florence McAlary, Cascade Pass, 1997.

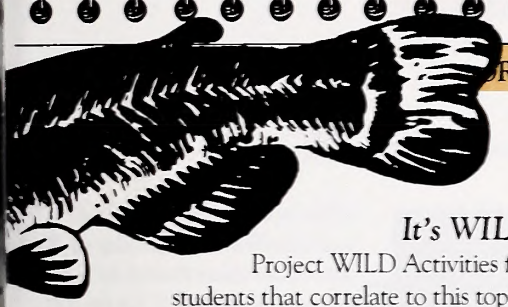


***As a district biologist**, I'm responsible for answering hundreds of technical questions from landowners. Here're some questions that people ask me:*

- *What can I do to get rid of the weeds in my pond?*
- *What types of fish do I need to stock in my pond?*
- *My fish are dying. What's going on?*

***When I'm out** on the lake, people also want to know what I'm doing and why. They'll ask me where to go to catch fish. And I've gotten a lot of phone calls in the last six months regarding* **Pfiesteria**. *People are concerned about this organism and its effects on human health.*

edited by Lawrence S. Earley



It's WILD!

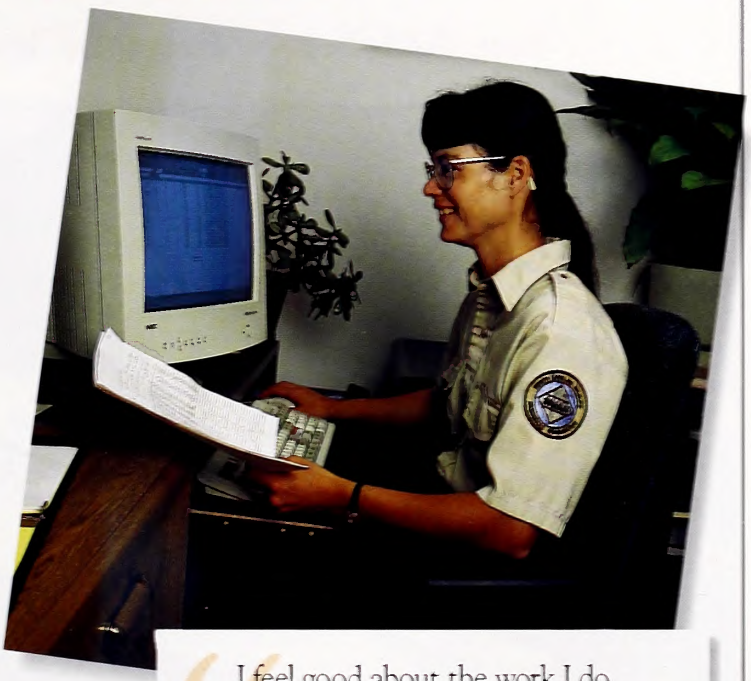
Project WILD Activities for teachers and students that correlate to this topic include:

Living Research: Aquatic Heroes and Heroines: teaches students about the accomplishments of local people who have helped to conserve aquatic environments.

Which Niche? Teaches students to define ecological niches by comparing them with careers in their community.

Wildlife Research: teaches students to identify reasons for research related to wildlife and to design and to conduct a wildlife research project.

Wildwork: teaches students to name and describe three wildlife occupations.

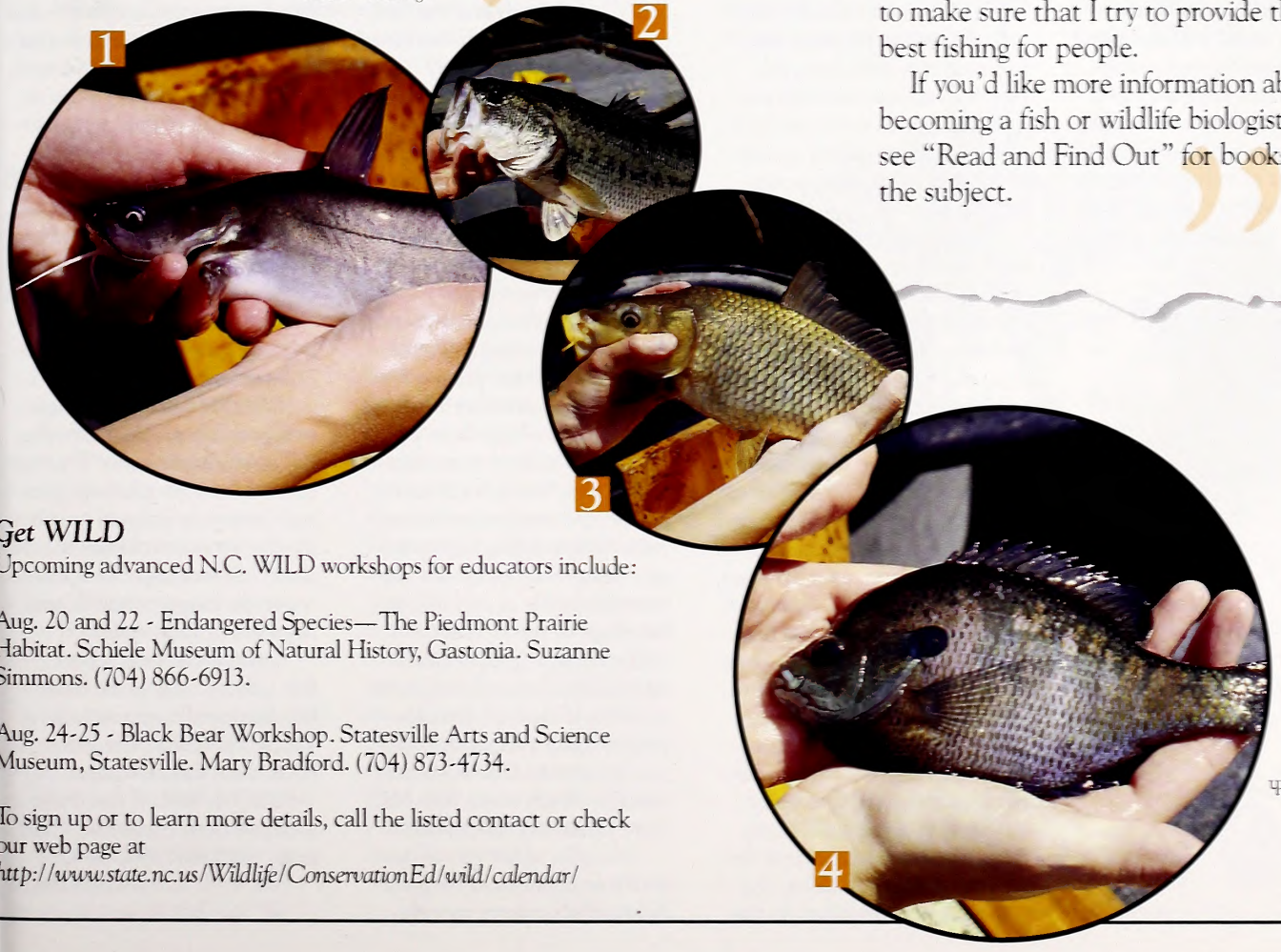


"I feel good about the work I do. Fishing is a sport as well as a hobby for a lot of people. As a fish biologist, I try to make sure that I try to provide the best fishing for people.

If you'd like more information about becoming a fish or wildlife biologist, see "Read and Find Out" for books on the subject."

Can you name these fish

Answers below right



Answers:
1-channel catfish
2-largemouth bass
3-carp
4-bluegill

Get WILD

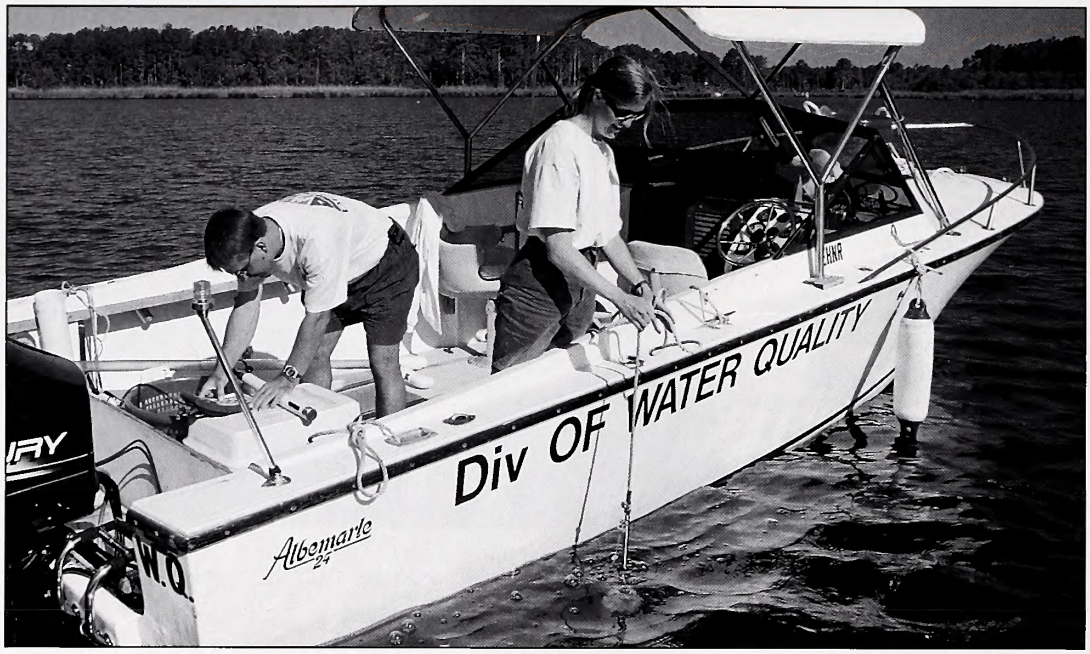
Upcoming advanced N.C. WILD workshops for educators include:

Aug. 20 and 22 - Endangered Species—The Piedmont Prairie Habitat. Schiele Museum of Natural History, Gastonia. Suzanne Simmons. (704) 866-6913.

Aug. 24-25 - Black Bear Workshop. Statesville Arts and Science Museum, Statesville. Mary Bradford. (704) 873-4734.

To sign up or to learn more details, call the listed contact or check our web page at *http://www.state.nc.us/Wildlife/ConservationEd/wild/calendar/*

State Adds Second Response Team to Monitor Coastal Fish Kills



KEN TAYLOR

***The state Division** of Water Quality has added a second Rapid Response Team (above) to help monitor fish kills along the North Carolina coast this summer. The additional team is part of the state's commitment to improve water quality monitoring in remote estuaries, where most fish kills occur.*

Edited by Rodney Foushee

The bad news is heavy winter and spring rains may increase fish kills along the North Carolina coast this summer. The good news is the state is beefing up its efforts to identify and monitor these potential fish kills.

When a fish kill occurs, state water quality experts must work quickly. Potentially contaminated fish can sink, flow downstream or be eaten by predators; and if the cause of death can't be determined, neither can the solution.

At the request of Gov. Jim Hunt, the N.C. Division of Water Quality assembled a second rapid response team this summer. The four-member team, which consists of biologists and water quality experts, has been installed in Washington to oversee the Tar-Pamlico river basin. Officials with the Department of Environment and Natural Resources established the additional team to improve water-monitoring capabilities along estuarine areas, where most fish kills occur. Until recently, the responsibility had fallen on the DWQ's field staff and the first response team, which was based in New Bern during 1997.

"The Tar-Pamlico is an area that has historically had a number of fish kills," said Ernie Seneca, a Division of Water Quality spokesperson. "This new team will provide rapid response to those kills and other water-quality problems."

In addition to a 24-foot boat, the teams are equipped with pagers and cellular phones for instant communication. Select fishermen also have been issued cell phones to report any signs of fish kills. Once a kill is reported, the response teams are immediately dispatched to the area where they gauge the number and species of fish affected, the range of the incident and various water-quality values such as low oxygen levels, sores on fish and algae blooms. For a more exact prognosis, samples are sent to DENR's lab in Raleigh, which works with N.C. State University researchers.

Fish kills, which can occur year-round, are most frequent during the summer months when water temperatures are warmer. This summer the problems were exacerbated by a high amount of rainfall. "Too much runoff from fields and urban areas along with waste spills have gotten into our streams and rivers," Seneca said. "This increased nutrient loading is projected to cause more problems in our estuary waters."

Because most of the state's rivers flow eastward, the nutrients concentrate in the coastal estuaries and aid the growth of oxygen-depleting organisms like bacteria and algae. In addition, fish kills can be caused by salinity fluctuations, high water temperatures and toxic algae such as Pfiesteria.

Discovered in 1991 by N.C. State University researchers, Pfiesteria is a microorganism that can produce a toxin lethal to fish. The main indicator of Pfiesteria is a red lesion that develops on the back half of fish. Kills associated with Pfiesteria typically occur June through October and are in the lower portions of the Neuse, Pamlico and New rivers. Research is underway into the causes of Pfiesteria, including the role pollution plays in promoting the organism and its effects on human health.

DWQ officials urge people to report any problem affecting the state's waterways. "The fact that we have people calling in with concerns is key to us solving the various problems out there," Seneca said, "be it wastewater discharge, runoff from a hog farm or floating fish."

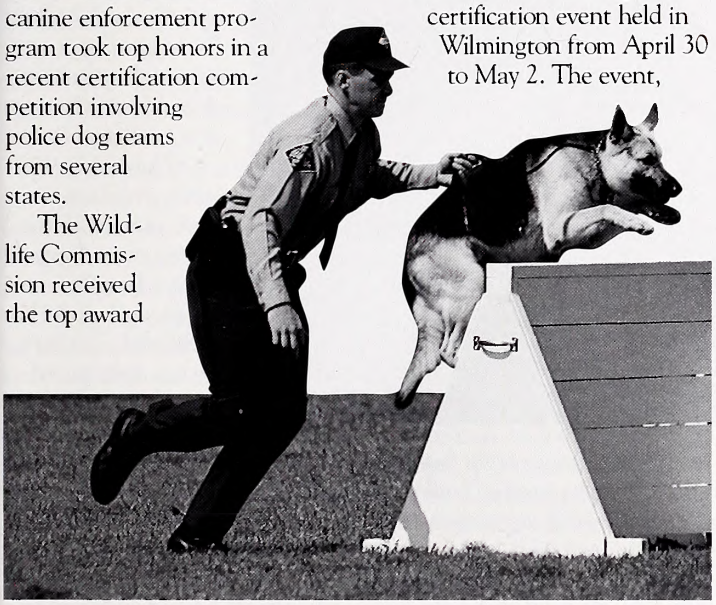
Citizens can help report fish kills by calling the Tar-Pamlico rapid response team at 1-877-337-2383. The Neuse River team can be reached at 1-888-764-7661. If you think you have been exposed to Pfiesteria, call 1-800-662-7030.

—Chris Powell

Wildlife Commission Canine Team Takes Top Honors

The N.C. Wildlife Resources Commission's canine enforcement program took top honors in a recent certification competition involving police dog teams from several states.

The Wildlife Commission received the top award for the best-trained four-man canine team at the regional certification event held in Wilmington from April 30 to May 2. The event, sponsored by the U.S. Police Canine Association, included 61 police dogs from 26 law enforcement agencies representing three states and Washington D.C.



KEN TAYLOR

***The Wildlife Commission's canine** enforcement program scored high marks at a regional certification event recently held in Wilmington.*

Six of the Wildlife Commission's eight enforcement dogs and their handlers scored high enough on the individual certification to qualify for the national police dog trials to be held in Mattoon, Ill., in September. Officer Vance Gibson of Tuckasegee and his dog Max scored the highest among North Carolina wildlife officers and took fifth place in the overall competition.

Scores are based on tests of obedience, agility, criminal apprehension and search ability.

Though dogs are routinely used in police work to detect drugs and explosives, they are far less common among wildlife enforcement agencies. In 1996, the N.C. Wildlife Commission expanded its canine enforcement program statewide after a successful pilot program. Instead of drugs, its wildlife enforcement dogs are trained to detect game, fish, guns and ammunition, as well as to track people in the woods and protect wildlife officers. The Wildlife Commission's program has proven wildly successful with hundreds of wildlife enforcement cases made each year using dogs in North Carolina without a single injury reported by a canine handler.

The Wildlife Commission uses German shepherds that have been donated by the public to its canine program. Each dog undergoes 15 weeks of training with its handler before being used in fieldwork.

That First Fish

March, capricious at best, throws a wide variety of weather our way, but inevitably it also serves up that occasional day when optimal conditions prevail. I chose a day early last March to introduce my 4-year-old daughter, Sierra, to a world I have enjoyed nearly all my life.

Sierra arose early that morning and was soon ready to go. We left Graham for Bass Mountain and after purchasing several cartons of night crawlers we arrived at a local farm pond where I have enjoyed large amounts of success. Because of Sierra's reaction to the worms, I knew I would be baiting the hook.

I discovered rather quickly that my young fishing buddy needed a good deal of hands-on help. I put her hair back under her hat and sat her down on some plastic to keep dry. Next came her package of cookies, soft drink and a strategic cast of the rod. We were now in the waiting game.

That first fish was not long in coming and was most accommodating in inhaling the worm. It was a large, colorful bream. She struggled with the fish with an intensity that surprised me, before finally backing steadily up the bank to bring the fish flopping into the grass.

After I unhooked my daughter's prize catch, she was more than willing to pose for a few photographs. We caught many more fish that day, but none to rival "ol' No. 1." My daughter, not as green as she was young, is to this day ready to jump in the car when any word of fishing is mentioned. I can think of no better format to strengthen the bond between a parent and child, and no better place than North Carolina for an experience like ours.

—Weldon L. Jenkins
Graham, N.C.

ILLUSTRATED BY WELDON L. JENKINS ©1998

Fish and Wildlife Service Proposes Changes in Waterfowl Baiting Rules

The U.S. Fish and Wildlife Service is proposing major changes in the migratory bird hunting rules to help clarify the regulations involving hunting waterfowl over bait.

The rules involving baiting—the practice of scattering salt, grain, or other feed over bird-hunting areas—are often confusing to hunters. This proposed change should help ensure the long-term conservation of migratory birds while providing clarity for the public and consistency and fairness in law enforcement operations.

KEN TAYLOR

***The U.S. Fish and Wildlife Service is** proposing some major changes in the regulations involving hunting ducks and geese over bait. The changes should help clarify waterfowl baiting rules and encourage the conservation of moist-soil management areas to benefit migratory birds.*

"These proposed changes are the result of an exhaustive review of baiting regulations during which we have received a great deal of input from state fish and wildlife agencies and the public, including hunters and conservation groups," said Service Director Jamie Rappaport Clark. "They serve to clarify the rules so that waterfowl hunters will know what is allowed and what is not allowed when they go into the field.

"We expect no adverse effect on migratory bird populations as a result of these proposed regulatory changes," Clark said. "In fact, the additional areas of natural vegetation that are expected to be preserved because of the proposed changes will benefit waterfowl and other migratory birds."

Overall, the proposal would clarify the conditions under which waterfowl hunting over manipulated vegetation may lawfully occur. Here are the major points of the proposal:

• Hunters would be allowed to hunt waterfowl over natural vegetation that has been mowed or otherwise manipulated to benefit migratory birds as long as the manipulation takes place at least 10 days before the start of any waterfowl season and does not occur during any open waterfowl season. This change addresses concerns that current baiting regulations have discouraged the conservation and management of moist-soil areas to benefit waterfowl and other migratory birds. The proposed regulations recognize the need to allow the manipulation of these areas to benefit migratory birds, while still allowing reasonable hunting opportunities. As in current regulations, there would be no restriction on manipulating natural vegetation and hunting migratory game species other than waterfowl and cranes. Hunters would also be assured that the accidental scattering of seed during the normal course of hunting would not constitute illegal baiting.

• The regulations would, for the first time, distinguish between agricultural areas and areas of natural vegetation and establish separate and clear rules for each. The proposal defines natural vegetation as non-agricultural, native, or naturalized plant species, including millet that grows at a site in response to planting or from existing seeds.

• On agricultural lands, the proposed regulations would consolidate and clarify the distinction between land-management practices allowable for waterfowl hunting and those allowable for the hunting of other migratory game birds, such as doves. The proposed regulations use one land-management-related term for the hunting of all migratory birds: "normal agricultural and soil stabilization practices."

• The Fish and Wildlife Service would rely on the U.S. Department of Agriculture for recommendations about normal agricultural planting, harvesting and soil stabilization practices. By designating U.S. Department of Agriculture state specialists as authorities on agricultural issues, the Fish and Wildlife Service, in cooperation with state fish and wildlife agencies, would use a reliable source of guidance for determining the legality of hunting over agricultural areas.

• Hunting would be allowed over an agricultural field that has been subject to a normal agricultural or soil stabilization practice.

• Hunting any migratory birds over areas planted by top sowing of seeds where the seeds remain on the ground would be prohibited. The Service has determined that it is often difficult to tell whether seed broadcast by top sowing is part of normal agricultural planting or is intended to lure birds to hunters illegally. Any such area would be considered a baited area until 10 days after the seed has been removed from the ground. The Service proposes to maintain the current prohibition on hunting migratory birds over any baited area until 10 days after the seed or grain has been removed, also known as the 10-day rule.

• The "strict liability" standard under which hunters may be cited for hunting over a baited area regardless of whether they knew about the baiting or intended to violate the law will stay in effect. After extensive review, the Service opted not to change the strict liability standard because it is well established and has a high deterrent value.

In response to requests from many organizations and individuals, the Fish and Wildlife Service has extended the public comment period on the proposed changes to waterfowl baiting regulations until Oct. 1. Comments should be sent to: Director, U.S. Fish and Wildlife Service, P.O. Box 3247, Arlington, Va. 22203-3247.

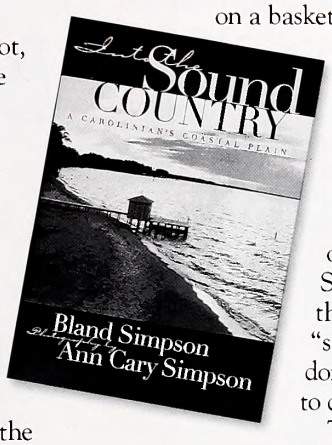
—Information courtesy of the U.S. Fish and Wildlife Service

Book Review: *Into the Sound Country*

Into the Sound Country: A Carolinian's Coastal Plain by Bland Simpson, photography by Ann Cary Simpson, The University of North Carolina Press, 269 pages, 1997, $34.95 hardback, $19.95 paperback.

"All the places and stuff of our home on the river were endlessly fascinating," writes Bland Simpson at the beginning of *Into the Sound Country*, his warmly appreciative and nostalgic account of growing up and knocking about in eastern North Carolina. Blending historical vignettes with personal anecdotes that span his lifetime, Simpson conducts the reader on a showboat tour of backwoods by-ways as wide and fascinating as the state itself.

It's a place he knows well, having grown up on the shores of the Pasquotank River in Elizabeth City, and, evidently, having listened well to the tales of his relatives and ancestors from the sound country, the big waters of the Pamlico, Currituck and Albemarle sounds. It's clear that he loves eastern North Carolina, loves the smell and the hot, sticky feel of the place, the sure, quirky way the people talk, the stories of the tar and turpentine, the swamps and boats, the characters and dogs and fishing and hunting of the place.



Simpson, of course, is no stranger to readers of *Wildlife in North Carolina*, where several of the stories in the book were first published. He's no stranger to the world, either, touring for many years as piano player and singer with North Carolina's famed Red Clay Ramblers. Yet like all great travelers he likes to come home, and home for him is eastern North Carolina.

He has a true ear for the native speech of the area. "I'm Joe Powell, I'm seventy-three years old, and I can stand on my head on a basketball," announces one character Simpson meets in Onslow County. The man had trained his dog to put out fires.

"Son, people way out in the country," Simpson's grandfather explained to him, "sometimes they just don't have a whole lot to do."

That's about as critical a comment as you'll find in this fine, amusing book. It's a book full of natural history —descriptions of the Black River's ancient cypress swamps, the Croatan's longleaf pine savannas, and the inscrutable and hostile pocosins of the region between the sounds. But Simpson's instincts are mainly anecdotal and historical. He's a low-voltage historian, paddling his song boat through a region that he loves and towing us along while pointing out the sights.

Take the trip; it's a hoot.

—*Lawrence S. Earley*

Rock Bass Record

A 1-pound, 14-ounce rock bass set a new state record for that species this spring, while a nearly 47-pound grass carp established another record.

Robert Lytton of Sanford caught the record breaker from the Deep River in April, surpassing the old record by 10 ounces. The rock bass was 13 inches long and had a 13 -inch girth. Lytton took the record fish with a crappie jig. The previous state record rock bass, caught by Gary D. Hess in 1984, was taken from the South Fork of the New River.

Kenneth Patterson of Moncure also established a state record with his 46-pound, 15-ounce grass carp taken from a Lee County farm pond on May 9. Patterson was fishing for bass when he hooked the carp on a floating Rapala lure. It took him more than an hour to land the grass carp using 6-pound-test line. The fish is the first recognized state record for the species.

Anglers who catch fish they think may break an existing state record should be careful in documenting the catch. The length, girth and weight should be recorded, and the fish must be weighed on certified scales with at least one witness. The angler should record the date and location of the catch. A full-side view photograph should be taken and included with the application for record certification.

Applications for submitting possible state record freshwater fish can be obtained from the Division of Inland Fisheries, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C., 27604-1188, or by calling (919) 733-3633.

Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

Aug. 1

BugFest will be held at the N.C. Museum of Natural Sciences in downtown Raleigh. The popular educational program will feature displays, exhibits and activities related to insects and arthropods. The highlight of the free event is the Cafe Insecta where various insect dishes will be served up for tasting. For more information, call Bob Flook at (919) 733-7450.

Aug. 27-29

Quail Unlimited will hold its 10th annual national convention at the Hilton Hotel and Charlotte Convention Center in Charlotte. Events will include the world championship quail-calling contest as well as numerous workshops on quail hunting and habitat improvement. For more information or to register for the convention, call Connie Green at (803) 637-5731.

Sept. 19

Big Sweep, a cleanup of North Carolina's beaches and waterways, will be held from 9 a.m. to 1 p.m. at various locations across the state. This year marks the 12th anniversary of this highly successful program. To volunteer for a cleanup of a beach or waterway in your area, call (800) 27-SWEEP.

Sept. 26

National Hunting and Fishing Day celebrates its 27th anniversary this year. The day honors the many contributions of hunters and anglers to the conservation movement. Check your local newspaper or sportsman's clubs for activities and events in your area.

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

KEN TAYLOR

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through May 1998

Principal Balance
$25,184,110.88

Interest Earned
$26,098,712.84

Total Receipts
$51,282,823.72

Interest Used
$15,250,446.04

Fund Balance
$36,032,377.68

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Cats and Wildlife

by Rodney Foushee

Though it might seem cruel at first glance, the predator-prey relationship, which has developed over millions of years, is a finely tuned system that keeps wildlife populations in check. Often humans alter these delicate relationships with little or no thought.

Take the case of the lovable house cat. Though many people consider them excellent pets, domestic cats when allowed to roam can have serious impacts on songbird and small wild mammal populations. Introduced by European colonists several hundred years ago, this efficient predator has radically changed some ecosystems in this country. Not only do cats destroy prey populations, but they also squeeze out natural predator populations that must compete with this formidable killing machine for food.

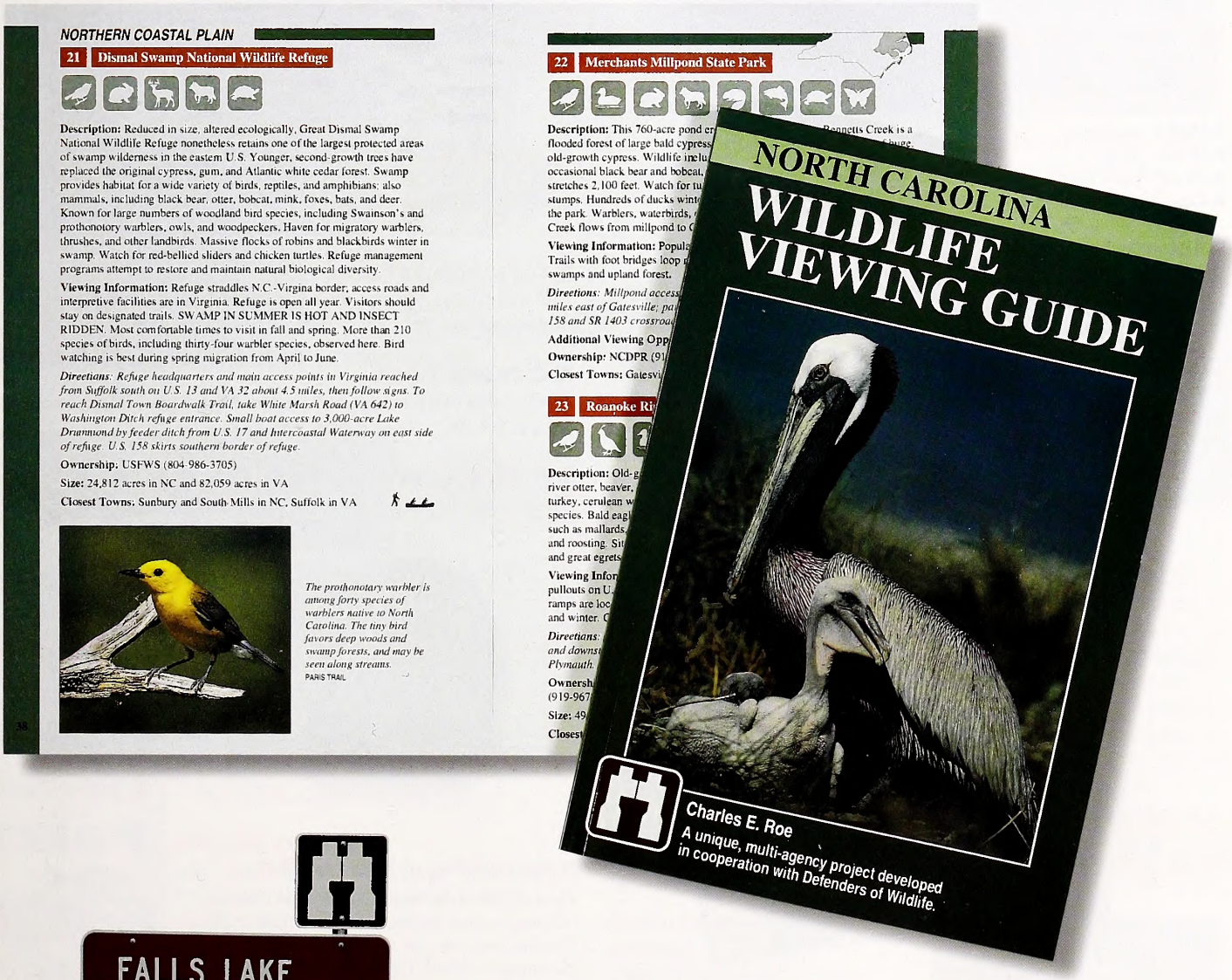
A recently completed report produced in Wisconsin, *Cats and Wildlife: A Conservation Dilemma*, details the devastating impact that the nation's nearly 100 million domestic cats have on wildlife populations. One free-ranging cat can kill up to 1,000 wild animals per year. Nationwide, rural cats kill billions of small mammals and hundreds of millions of birds. Since humans—not cats—can change their behavior, here are some things you can do to reduce the harmful impacts of domestic cats on wildlife.

- Keep only as many pet cats as you can take care of. Controlling reproduction and humanely euthanizing unwanted cats will keep their populations in check. On farms, keep only the least number of free-ranging cats needed to control rodents. Well-fed, spayed female cats will stay closest to farm buildings where rodent control is needed.
- If possible, keep your cat indoors at all times. This not only protects songbirds and other wildlife, but also protects your pet from disease and injury.
- Neuter or spay your cats to prevent them from breeding and encourage others to do so.
- Locate bird feeders in areas that don't provide cover for cats to wait in ambush. Install animal guards around trees that contain nesting birds to prevent cats from getting at them.
- Don't release unwanted cats in the country. Instead, contact your local animal welfare organization.
- Don't feed stray cats. Eliminate outdoor food sources such as garbage and pet food that attract strays. This prevents high cat densities that kill and compete with native wildlife.

N.C. WILD STORE

Roam with a View

Wildlife is nearer than you think. The secret is knowing where and when to look.



As you travel across North Carolina, look for these special highways signs that identify wildlife viewing sites.

North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. Each site was selected by a panel of wildlife experts from across the state. Included are detailed descriptions of each viewing site, maps and access information, helpful viewing tips and more than 50 color photos. **$5.95.**
ITEM CODE **N6**

More terrific items

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

White, 100% cotton (preshrunk) T-shirts are guaranteed for comfort and durability. Each shirt features an original design.

N.C. WILD T-SHIRT

N.C. WILD logo printed on front and colorful art on back. $14.50.

ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE IN N.C. T-SHIRT

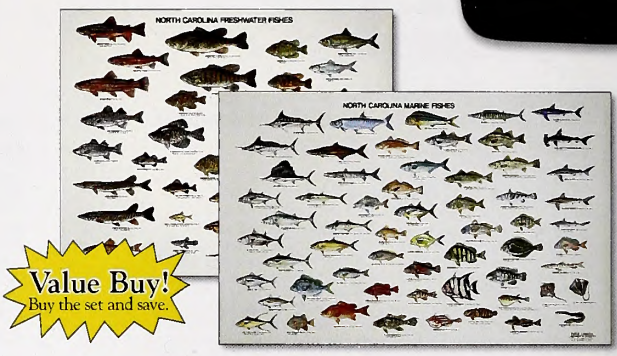
WINC magazine logo on front pocket. Tundra swan art on back. $14.50.

ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD CAP

N.C. WILD logo is embroidered on a pro-shape, brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. $16.50.

ITEM CODE **A1**



N.C. FRESHWATER FISHES

Find your favorite fish with this color poster showing 36 of the state's freshwater fishes. 28" x 22½". $6. ITEM CODE **P6**

N.C. MARINE FISHES

All the colors of the sea can be found on this poster of 60 marine fishes. 35" x 22½". $6. ITEM CODE **P7**

N.C. FRESHWATER FISHES AND N.C. MARINE FISHES

Save $2 when you buy both posters as a set. $10. ITEM CODE **P9**

LIZARDS OF N.C.

Shows all 12 of the state's lizard species. 22" x 34". $6. ITEM CODE **P3**

TURTLES OF N.C.

Shows all 21 of the state's turtle species. 22" x 34". $6. ITEM CODE **P4**

SNAKES OF N.C. (LIVEBEARERS)

Shows all 17 of the state's livebearing snake species. 22" x 34". $6. ITEM CODE **P5**

SNAKES OF N.C. (EGGLAYERS)

Shows all 19 of the state's egg-laying snake species. 22" x 34". $6. ITEM CODE **P8**

SET OF 4 POSTERS

You'll save $6 by purchasing the set of four posters above. $18.

ITEM CODE **P10**

WILDLIFE IN N.C. CAP

Buck deer silhouette with magazine logo is embroidered on a pro-shape, washed-canvas cotton cap with an adjustable cloth strap and buckle closure. Two-tone cap is navy/stone. $16.50.

ITEM CODE **A2**

DOGS THAT POINT, FISH THAT BITE

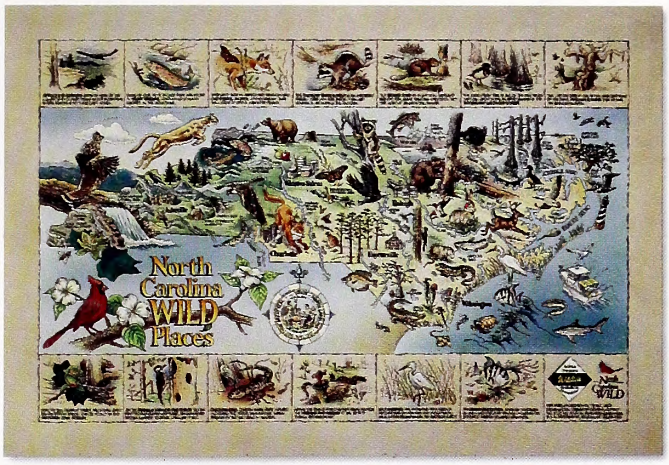
Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission; hardbound; 220 pages. $19.95. ITEM CODE **M8**

WILDLIFE IN N.C. CAP

Brook trout and magazine logo are embroidered on a sage-colored, premium weight, pigment-dyed, brushed cotton cap with an unstructured front, an extended bill, and a nubuck suede closure. $16.50. ITEM CODE **A3**

Nature's Ways Collection

Since 1978, the illustrated "Nature's Ways" essays in the pages of *Wildlife in North Carolina* have explored wildlife species, ecosystems and the wonders of the natural world. Now more than 200 of these essays are available in paperback. Sold only as a six-volume set. $27.50. ITEM CODE **M9**



North Carolina WILD Places Map

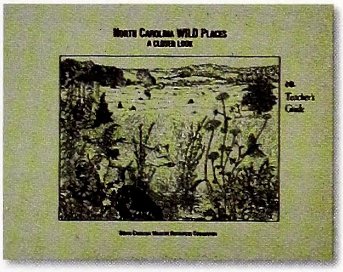
Artist's Proof. $40. ITEM CODE **E2**
Limited Edition. $25. ITEM CODE **E3**
Poster. $6. ITEM CODE **E4**

Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.
ITEM CODE **M6**

North Carolina WILD Places: A Closer Look Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. $6.
ITEM CODE **E7**



Value Buy!
Buy the set and save.

North Carolina WILD Places Posters

(Set of 3): Posters of "Old Field" and "Mountain Cove Forest" from *North Carolina WILD Places: A Closer Look*. 19 1/2" x 16". Shipped folded with poster version of WILD Places Map. $8. ITEM CODE **E5**

WILD Places book and posters

Buy the *North Carolina WILD Places* book and all three posters and save! (Items E1 and E5) $16. ITEM CODE **E6**

North Carolina WILD Places: A Closer Look

Easy-to-read text and Anne Marshall Runyon's delightful illustrations make wildlife habitats come alive in this 82-page book. Discusses 13 habitats across the state. $10.
ITEM CODE **E1**

Wildlife in North Carolina Book

The best of *Wildlife in North Carolina* magazine. Hardbound. $12.
ITEM CODE **M3**

Magazine Binder

Store 12 issues of the magazine in a sturdy brown leather-look binder with gold lettering. $10.
ITEM CODE **M2**

North Carolina WILD Journal

Handy calendar notes on wildlife behavior through the year, with room for personal observations. Supplements N.C. WILD Education Sites workshop. $6.
ITEM CODE **E8**

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
Cub & Boy Scout Correlation. ITEM CODE **E9**
Girl Scout Correlation. ITEM CODE **E10**

More terrific items

N.C. WILD STORE

Value Buy!
Buy the set and save.

All Things Are Connected

Stirring 12-minute video adaptation of Chief Seattle's speech introduces environmental ethics. $20.
ITEM CODE **W1**

This Land Is Sacred (Teacher's Guide)

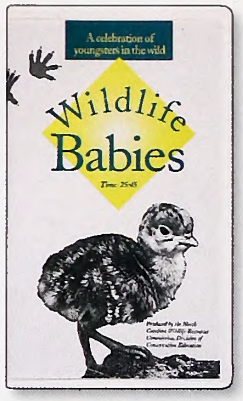
Classroom activities to accompany All Things Are Connected video.
$4.50. ITEM CODE **W2**

All Things Are Connected & This Land Is Sacred

Video and Teacher's Guide package. $22. ITEM CODE **W3**

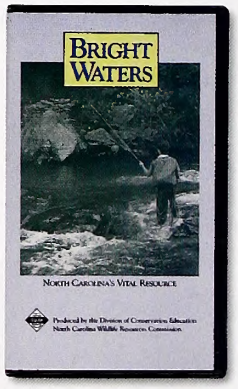
N.C. WILD Notebooks

Each set contains eight issues of *North Carolina WILD Notebook*, the Commission's prize-winning conservation education newsletter. $3 per set.
'95-'96 Set ITEM CODE **E11**
'96-'97 Set ITEM CODE **E12**



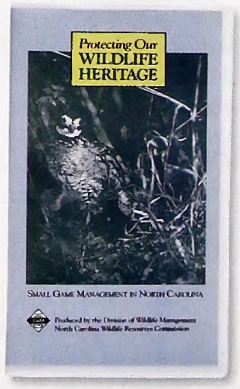
Wildlife Babies

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others. $20. ITEM CODE **N9**



Bright Waters (Video)

30-minute video on fishing and fisheries management in North Carolina's freshwater creeks, rivers and ponds. $20. ITEM CODE **N7**



Protecting Our Wildlife Heritage (Video)

25-minute video offers useful tips for landowners on managing small game. $20. ITEM CODE **N8**

Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. $2. ITEM CODE **M5**

WILDlife Profiles

Each set is designed to fit your standard 3-ring binder and features 10 animal fact sheets. **$2 per set.**

Set 1. Black bear, raccoon, white-tailed deer, striped skunk, bobwhite quail, wild boar, muskrat, mourning dove, coyote, mallard. ITEM CODE **W4**

Set 2. Mink, canvasback duck, red fox, wild turkey, beaver, American river otter, Canada goose, bobcat, red wolf, cougar. ITEM CODE **W5**

Set 3. Humpback whale, black duck, osprey, clapper rail, red-shouldered hawk, cottonmouth, diamondback terrapin, largemouth bass, black crappie, channel bass. ITEM CODE **W6**

Set 4. Brook trout, garden spider, Tar spiny mussel, wood duck, bullfrog, mayfly, tiger salamander, bog turtle, hellbender, shortnose sturgeon.
ITEM CODE **W7**

Set 5. Cottontail rabbit, gray squirrel, northern flying squirrel, newt, common crow, red-tailed hawk, prothonotary warbler, bluegill, striped bass, Eastern oyster. ITEM CODE **W8**

Set 6. Opossum, peregrine falcon, Eastern bluebird, American toad, rat snake, Eastern glass lizard, smallmouth bass, brown trout, monarch butterfly, Virginia big-eared bat. ITEM CODE **W9**

Set 7. Chipmunk, gray fox, bald eagle, loggerhead shrike, common snapping turtle, five-lined skink, bluefish, rainbow trout, grasshopper, horseshoe crab.
ITEM CODE **W10**

Set 8. Appalachian cottontail, manatee, barred owl, turkey vulture, Neuse River waterdog, spring peeper, coral snake, American alligator, American eel, American shad. ITEM CODE **W11**

Set 9. Southern flying squirrel, fox squirrel, great horned owl, snowy egret, Southern leopard frog, corn snake, Atlantic sturgeon, walleye, luna moth, crayfish. ITEM CODE **W12**

Set 10. Marsh rabbit, woodchuck, hooded warbler, whippoorwill, green salamander, copperhead, fence lizard, muskellunge, chain pickerel, Scotch bonnet. ITEM CODE **W13**

Set 11. Atlantic croaker, Southern flounder, summer flounder, spot, king mackerel, Spanish mackerel, sea mullet, weakfish, spotted seatrout, striped mullet. ITEM CODE **W14**

Set 12. Bay scallop, black sea bass, blue crab, brown shrimp, spiny dogfish and smooth dogfish, gag, hard clam, menhaden, sandbar shark, white perch.
ITEM CODE **W15**

N.C. WILD STORE ORDER FORM

Use this form to order educational products. Use the magazine subscription form inside for magazine orders.

Provide your shipping information here. Please give a street address; we cannot deliver to a post office box.

Name _____ Home phone (___) ___-____
first name MI last name area code

Mailing Address _____

Shipping Address _____

City _____ State ___ Zip _____-____

ITEM CODE	ITEM NAME/DESCRIPTION	SHIRT SIZE	QUANTITY	PRICE	$ TOTAL

Make checks payable to: N.C. Wildlife Resources Commission. Send your order to: The N.C. WILD Store, PO Box 29607, Raleigh, N.C 27626-0607.

All orders must be prepaid. We do not bill. Please do not send cash. Allow 4 weeks for delivery of your order. $20.00 service charge for returned checks (N.C.G.S. 25-3-512). Products may be purchased over the counter at The N.C. WILD Store, 322 Chapanoke Road, Raleigh, N.C. Telephone (919) 662-4377.

→ (Do not include magazine subscriptions.) ..... **SUBTOTAL**	$
→ (Subtract 15% for retail orders of $100 or more.) ..... **DISCOUNT**	$
→ (N.C. residents add 6% sales tax.) ..... **TAX**	$
→ (See shipping chart below.) ..... **SHIPPING & HANDLING**	$
→ (Add all items above.) ..... **TOTAL**	$

For credit card orders, provide information below.

CREDIT CARD NUMBER

EXP. DATE ( ) _____
Daytime Phone Number

_____
Credit Card holder's signature

SHIPPING & HANDLING MUST BE INCLUDED OR ORDER WILL BE RETURNED
Shipping and handling based on subtotal.
$10.00 and under, **ADD** $2.00
$10.01 to$25.00, **ADD** $3.50
$25.01 and over, **ADD** $5.00

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

LIFETIME LICENSES AND LIFETIME MAGAZINE SUBSCRIPTIONS

ENDOW 98

Complete form and mail with proper payment to: Wildlife Endowment Fund, N.C. Wildlife Resources Commission, PO Box 29565, Raleigh, NC 27626-0565.
Office is located at 322 Chapanoke Rd., Raleigh, NC 27603. Telephone 1-888-NCWILDLIFE or 1-888-629-4535.
Please make checks payable to the Wildlife Endowment Fund. $20 service charge for returned checks (NCGS 25-3-512).

	PRICE
☐ Lifetime Comprehensive Fishing (residents only) (includes basic fish, trout and trout waters on game lands)	$250.00
☐ Lifetime Subscription to *Wildlife in North Carolina* magazine	$100.00

Infant and Youth Licenses:

☐ Lifetime Sportsman Infant (under 1 year of age) (Application must be received before one year of age)	$200.00
☐ Personalized Lifetime Sportsman Infant (under 1 year of age) (Application must be received before one year of age)	$205.00
☐ Lifetime Sportsman Youth (age 1 through 11) (Application must be received before 12 years of age)	$350.00
☐ Personalized Lifetime Sportsman Youth (age 1 through 11) (Application must be received before 12 years of age)	$355.00

A copy of a certified birth certificate (or the mother's copy) must accompany applications for sportsman's licenses for infants and youths.
Please note: Hospital copies will not be accepted. Also, birth certificates cannot be returned.

Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult at least 21 years of age, who is properly licensed to hunt in North Carolina. "Accompanied" is defined as being able to take immediate control of the hunting device.

☐ Lifetime Sportsman (residents only) (age 12 or older) (includes basic hunt and fish, big game, game lands, primitive weapons, trout, N.C. waterfowl [Federal waterfowl stamp is mandatory and must be purchased separately.])	$500.00
☐ Personalized Lifetime Sportsman (residents only) (age 12 or older)	$505.00
☐ Lifetime Nonresident Sportsman (age 12 or older) (includes basic hunt and fish, big game, game lands, primitive weapons, trout, N.C. waterfowl [Federal waterfowl stamp is mandatory and must be purchased separately.])	$1,000.00
☐ Lifetime Comprehensive Hunting (residents only) (includes basic hunt, big game, game lands, primitive weapons)	$250.00

On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or making out a written statement that he had such a license.

Check appropriate block and attach required copy

☐ Copy of Prior Year Hunting License ☐ Copy of Hunter Safety Certificate of Competence

☐ In lieu of copy, I am completing a written statement (complete below).

STATEMENT: I CERTIFY THAT I WAS A LICENSED HUNTER PRIOR TO JULY 1, 1991.

Date _____ Signature of Applicant _____

PLEASE TYPE OR PRINT LEGIBLY

Applicant Name: _____ (First) (Middle) (Last)

Address: _____ (Street/R.F.D.) (City) (State) (Zip)

Date of Birth _____ (Month/Day/Year) Social Security No.: _____ Driver's License No.: _____

Male: ☐ Female: ☐ Telephone Number: (___) _____ County _____

_____ Date _____ Applicant or Donor Signature

If a personalized lifetime sportsman's license is being ordered, please indicate your selection of letters, numbers, dashes, periods, commas and/or blanks. Only six spaces may be used.

_____ _____ _____ _____ _____ _____

The personal message for the personalized sportsman's license may include up to 21 spaces, including letters, numbers, dashes, periods, commas and/or blanks. Please write in your message as you wish it to appear.

Donor's Name and Address (if applicable)

_____

_____

_____

_____

I wish to make a tax-deductible contribution to the Wildlife Endowment Fund. Enclosed is a check for $ _____. Please make checks payable to the Wildlife Endowment Fund.

N.C. Wildlife Resources Commission Merchant #8430 0755 0

To charge your purchase to your VISA or MasterCard you MUST complete the form below (donations cannot be charged).

Card Holder's Name and Address (Please Print)

_____

_____

_____

_____

☐ VISA ☐ MasterCard

Expires_____/ _____ Acct. No. _____

Card Holder's Signature _____

DO NOT WRITE IN THIS SPACE FOR COMMISSION USE ONLY

_____ ___ ___ ___ ___ ___

_____

Lifetime License $ _____

Lifetime Magazine $ _____

Total Charge $ _____

Authorization Code Number

_____

Wildlife Commission **Spotlight**

Wildlife Education Takes Center Stage

***Visitors to the** N.C. Wildlife Commission's trout hatchery raceways can learn about production and stocking programs.*

***The outdoor exhibits** walkway features a model N.C. WILD Education Site that demonstrates how wildlife habitat can be developed and used as an educational tool and conservation action project.*

***The outdoor exhibits** walkway features learning stations that interpret the natural surroundings, mountain habitats and wildlife conservation.*

"Mountain Streams, Where Water and Life Begin"

One of the North Carolina Wildlife Commission's primary functions is to educate the public about wildlife conservation. This effort has taken a big step forward with the opening of the Wildlife Commission's Pisgah Center for Wildlife Education. Located in the Pisgah National Forest within Transylvania County, the theme of the center is "Mountain Streams, Where Water and Life Begin." Through interactive displays and exhibits that focus on water, visitors experience the geologic formation of the region, gain understanding of the interactions among humans and the natural world and learn how the Wildlife Commission works to conserve the state's valuable natural resources. The center also offers public restrooms, a N.C. WILD Store gift shop stocked with educational materials produced by the Division of Conservation Education and a classroom where educational workshops are offered.

A Walk On the Wild Side

The center's outdoor exhibits walkway winds over pristine mountain trout streams. Along the walkway, learning stations offer audio programs and exhibits that interpret the natural surroundings, mountain habitats and wildlife conservation. The outdoor exhibits also contain an example of a N.C. WILD Education Site that demonstrates how wildlife habitat can be developed and used as an educational tool and conservation action project.

Taking Stock in the Future

The outdoor exhibits area ends with a trip to the raceways of the adjacent Pisgah Fish Hatchery. This hatchery is used by the Wildlife Commission to raise trout for stocking mountain streams. Visitors can view and help feed some of the 400,000 trout being raised from fingerlings to mature fish. Throughout the summer until Labor Day, the program "Raising Trout" is presented daily from 11:30 a.m. to 2 p.m. Special programs and workshops are also offered. For more information, call (828) 877-4423.

To reach the center, take Fish Hatchery Road, which turns off of U.S. 276 about seven miles west of its intersection with N.C. 280, just north of Brevard. Watch for the highway signs. ***Photographs by Ken Taylor***

Sharing the Heritage

Few things are more meaningful to a hunter than spending a day afield with a son or daughter. Yet North Carolina's hunting heritage may be in danger of not being passed on to the next generation. See story on p. 16.

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WILDLIFE IN NORTH CAROLINA

SEPTEMBER 1998 $1.50

Fishing's Fourth Level

by Jim Dean ©1998

ILLUSTRATED BY JACKIE PITTMAN ©1998

"...the most satisfying fish is the one you help someone else catch."

Several years ago, a Mexican family moved to our farm to help Curtis and Louise with the planting, harvest and other seemingly endless chores. The boys have been going to school here, and they speak English so well that they often serve as translators for their parents and for Curtis, Louise and me since we're all past that age when learning a new language is easy. But we have no problems, except I'm astonished they don't laugh harder when they hear me fracture the occasional Spanish phrase—imagine their elegant old-world language rendered by Huckleberry Hound.

I would reckon Isidro Jr. to be about 15. Late last summer, he was learning how to drive on the dirt paths around the farm, and he would wave whenever he passed the little three-room house I fixed up a few years ago to use as a getaway. One afternoon, he and three of his friends bounced to a stop in his dusty Chevette and asked if it would be all right if they fished in the pasture pond.

"Sure," I replied. "Bring a bucket and keep all the bluegills, crappies and other panfish you catch. Just turn loose the bass because they help keep the pond in balance."

They were back in a few minutes with their gear. I had work to do so I didn't join them, but they were still fishing in late afternoon when I finished up and walked down to the pond to see how they were doing. They had not caught a single fish.

"No bites?" I asked incredulously. "Nothing?"

"No bites," Isidro said, shrugging. "But we are having fun. I think I almost had a bite once."

That was when I began to notice their tackle. Except for an old push-button spin-casting outfit, they had only weathered cane poles or sticks cut in the woods. A glass jar containing half a dozen big grasshoppers lay nearby in the grass. They had neither red worms nor crickets. I looked at the terminal rigs on the poles—most were baited with very large grasshoppers on hooks big enough for king mackerel, and there were no split shot for weight under the corks. One fisherman had been simply dangling a plastic grub motionless in the water.

"What's on the spinning rod?" I asked, looking out towards the middle of the pond, where I could see a cork the size of a softball. The fisherman reeled it in. "What do you think?" he asked.

Hanging a foot beneath the cork was a Little George—a lead-head lure with a rear-mounted Colorado blade. Considering that it's designed mostly for distance casting on big lakes for schooling fish, it would be hard to imagine a more inappropriate choice. Impaled on its large treble hook were three giant grasshoppers.

"Holy smoke, guys," I said, or something like that. "I believe I see your problem. Tell you what, you go over there in the shade behind that tobacco barn where the dirt is soft and moist and dig some worms while I see if I can find some hooks and stuff in my truck."

In a few minutes, I had rigged their gear with smaller hooks and split shot, and I showed them how to bait the hooks, hiding the points in the bodies of the worms. "Adjust the corks so that you're fishing on or very near the bottom," I explained.

Almost immediately, they began to catch bluegills. It didn't matter that the fish were small. Laughing and shouting, they hauled them in as fast as they could bait their hooks. They were still at it when I had to leave, but they all stopped to wave. I had not thought to ask, but I don't think any of them had ever caught a fish.

During the 45-minute drive home, it occurred to me that I had been given the answer to something that had puzzled me for years. When I was 10 years old and just learning to fish, I was never able to understand why my grandfather took such obvious pleasure in watching me catch fish. Invariably, he made sure that I caught something, frequently sacrificing his own opportunities to do so. Even when I was older and more experienced, he would still position the boat to give me the first cast to any spot that was likely to yield a bass. I hadn't understood that then, but it was clear enough now.

There's an old saying that fishermen go through three stages of evolution. In the beginning, they try to see how many fish they can catch. Then, they concentrate on the biggest fish. Finally they seek only the most difficult fish. But I suspect there must be another, more subtle level when the most satisfying fish is the one you help someone else catch.

I wouldn't claim my evolution is complete, but thanks to Isidro and his friends, I'm getting there

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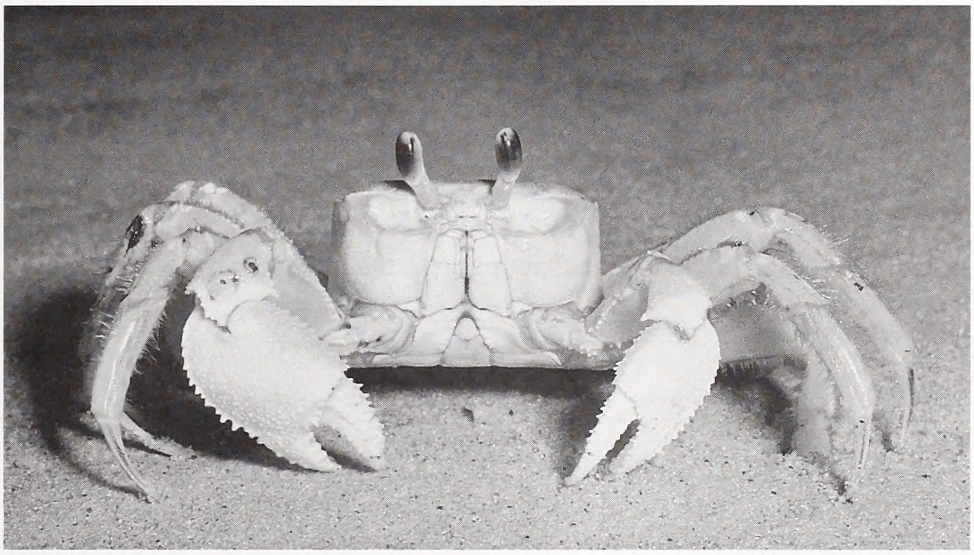

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Contents

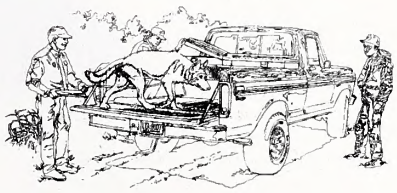
Wildlife in North Carolina

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

September 1998 *Volume 62, Number 9*

Features

4 **Boost Your Odds with Doves** *written by David Hart* ©1998 *photographed by F. Eugene Hester* ©1998
Want to take a limit of doves with a box of shells? Follow these simple tips and you just might.



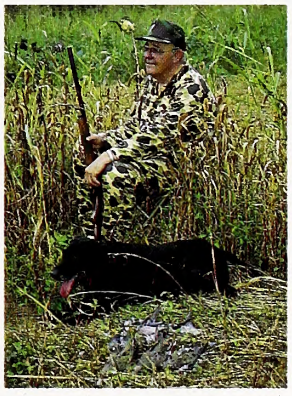
page 8

8 **Heads Up for Poachers** *written by Chris Powell illustrated by Jim Brown* ©1998
As the deer hunting season gears up, the Wildlife Commission's tough corps of enforcement officers polishes its skills for another dangerous year.

page 12

12 **Cool Moves for Hot Whitetails** *written by Mike Gaddis* ©1998
Hunting in the heat poses special challenges. Here's how to make the best of September prime time.

16 **Too Many Deer?**
When the white-tailed deer population peaked at 1 million several years ago, some people wondered whether North Carolina's deer herds had gotten out of control. In a wide-ranging interview with Wildlife in North Carolina's *editors, Scott Osborne, the Wildlife Commission's big-game coordinator, discusses the challenges of managing a growing deer population in a fast-growing and urbanizing state.*



page 4

20 **Hunting Season Roundup, 1998-1999**
Here's a quick look at North Carolina's major upcoming hunting seasons.

22 **Grasslands** *photographed by Lawrence S. Earley*
This isn't Kansas and these aren't tallgrass prairies, but spacious grasslands still sway over a surprising swath of North Carolina's landscape.

Departments

page 28

Our Natural Heritage *by Jim Dean* ©1998 ..... **inside cover**
Nature's Ways *by Roger Powell* ©1998 2
N.C. WILD Notebook *by Anne Marshall Runyon* ©1998 ... 28
Back Porch *by Rodney Foushee* 32
Wildlife Through the Year *by Rodney Foushee* 36
Cover *This 10-point buck can stir a deer hunter's dreams. Painting by James Brooks.* ©1998

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Shapes That Fit

written by Roger Powell ©1998
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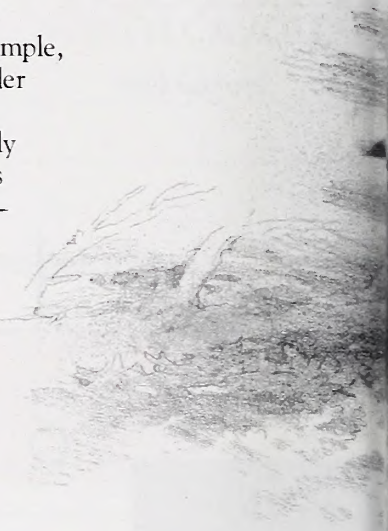


Why are animals' bodies shaped as they are? Why, for example, do bears have thick, solid legs instead of the long, slender legs of a deer?

There's a simple answer, of course: Animals' shapes are exactly what they need to enable them to survive. Yet the explanation goes deeper than that. Consider the needs of three different animals—a white-tailed deer, a wolf and a black bear. To escape predators, deer must run fast. To be a successful predator, the wolf needs speed, too, but must be able to use its paws for jobs other than running: to dig a hole for a den and to hold a bone while it chews. A black bear doesn't need the fleet speed of a deer, although it can run fast, but it does need power and dexterity in its paws. Thus a trade-off exists in all three of these animals between speed and power. If an animal's primary need is speed, it will have to sacrifice power. And vice versa.

The study of how animals' shapes affect their function (for example, speed versus power) is called functional morphology.

For example, a wolf has a skeleton that is adapted for running. It walks on its toes (it is *digitigrade*), it has evolved a reduced number of toes (four functional toes on each foot, not five) and relatively long bones at the ends of its legs. Because it walks on its toes, a wolf has longer legs than a bear and its legs are lighter because it has smaller leg muscles and bones. These adaptations enable a wolf to run with significant speed, although it lacks the heavy muscles it would need to wield the powerful and dextrous paws of a bear.

A deer has a skeleton even more specialized for running. Its legs are relatively lighter and longer than the wolf's and it is *unguligrade*—it walks on tiptoe. The bones at the ends of its legs are long and thin, and many bones and muscles found in mammals with standard skeletons are missing. Deer walk on only two elongate toes on each foot, the 3rd and 4th toes. The 1st toe (thumb or big toe) is missing and the 2nd and 5th toes appear only as fetlocks. Leg joints have tongue and groove shapes that restrict leg movements to forward and backwards. Consequently, deer lack the muscles that would have moved the missing toes and rotated the legs.

A bear has all the standard bones and muscles of mammalian legs but no adaptations for fast running. Its posture is *plantigrade*—it walks on the flat of each foot—and the bones near the ends of the legs are short. While the bear lacks the speed of the other two animals, it makes up for it with its great leg strength. A bear is stronger than a wolf, which is stronger than a deer. The difference in leg power derives from the leg joints of these three animals. Joints are systems of levers. When a force is applied to one end of the lever (the input end), the other end (output end) moves. If the fulcrum of the lever system is in the middle of the lever, both ends move at the same speed. If the fulcrum is close to the input end, the output end moves faster but with less strength.

For animals, a muscle supplies the force, a leg bone is the lever, and a joint is the fulcrum. Your elbow joint is a good example of a lever system. When the triceps muscles pull on your elbow knob, your arm extends. The elbow knob, or the short side of the lever, is relatively long in a bear, intermediate in a wolf, but short in a deer. The other leg joints for these mammals are configured similarly. Thus wolves are able to move their legs faster than bears but with less power, and deer are able to move their legs faster yet.

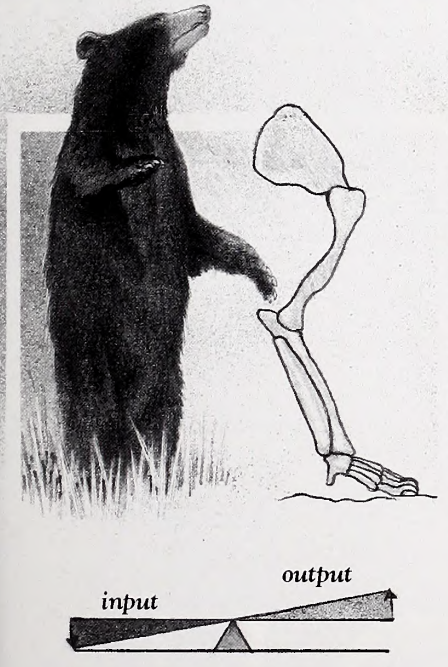
With leg levers built for speed, a deer needs massive muscles in its shoulders and hips just to move its long, light legs and to push its body forward as it runs. With leg levers built for power, a bear can open a log in search of beetle larvae and pupae, while a deer can only chip at it with dainty hooves.

Other reading

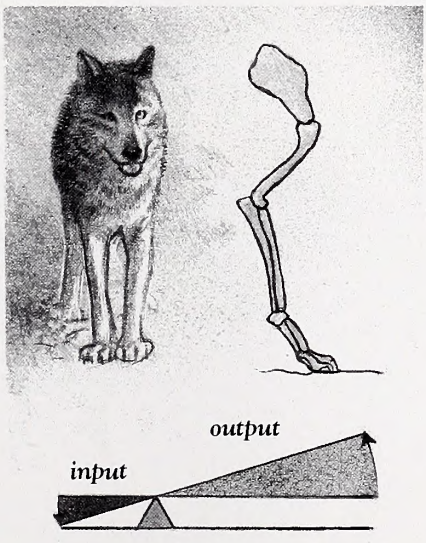
- Hildebrand, M, D M, et al., (editors). *Functional Vertebrate Morphology* (Harvard University Press, 1985).
- Radinsky, L. B. *The Evolution of Vertebrate Structure* (University of Chicago Press, 1987).

Roger Powell is an associate professor of zoology at N.C. State University.

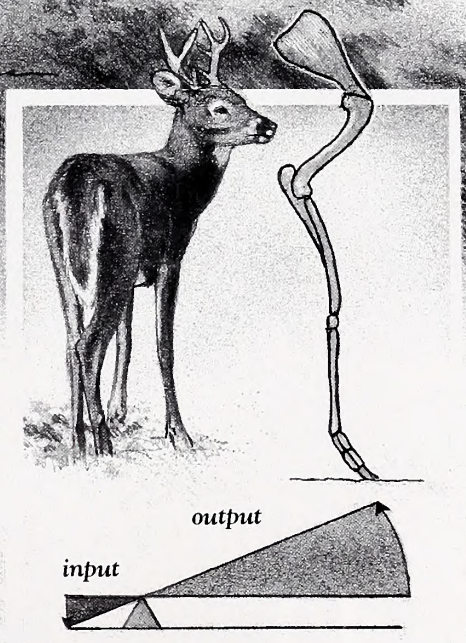
The different needs *of animals for speed versus power result in very different body shapes. The white-tailed deer is an animal that relies on fleet speed to escape predators. Its body shape, and especially the construction of its legs, is very different from that of wolves and black bears.*



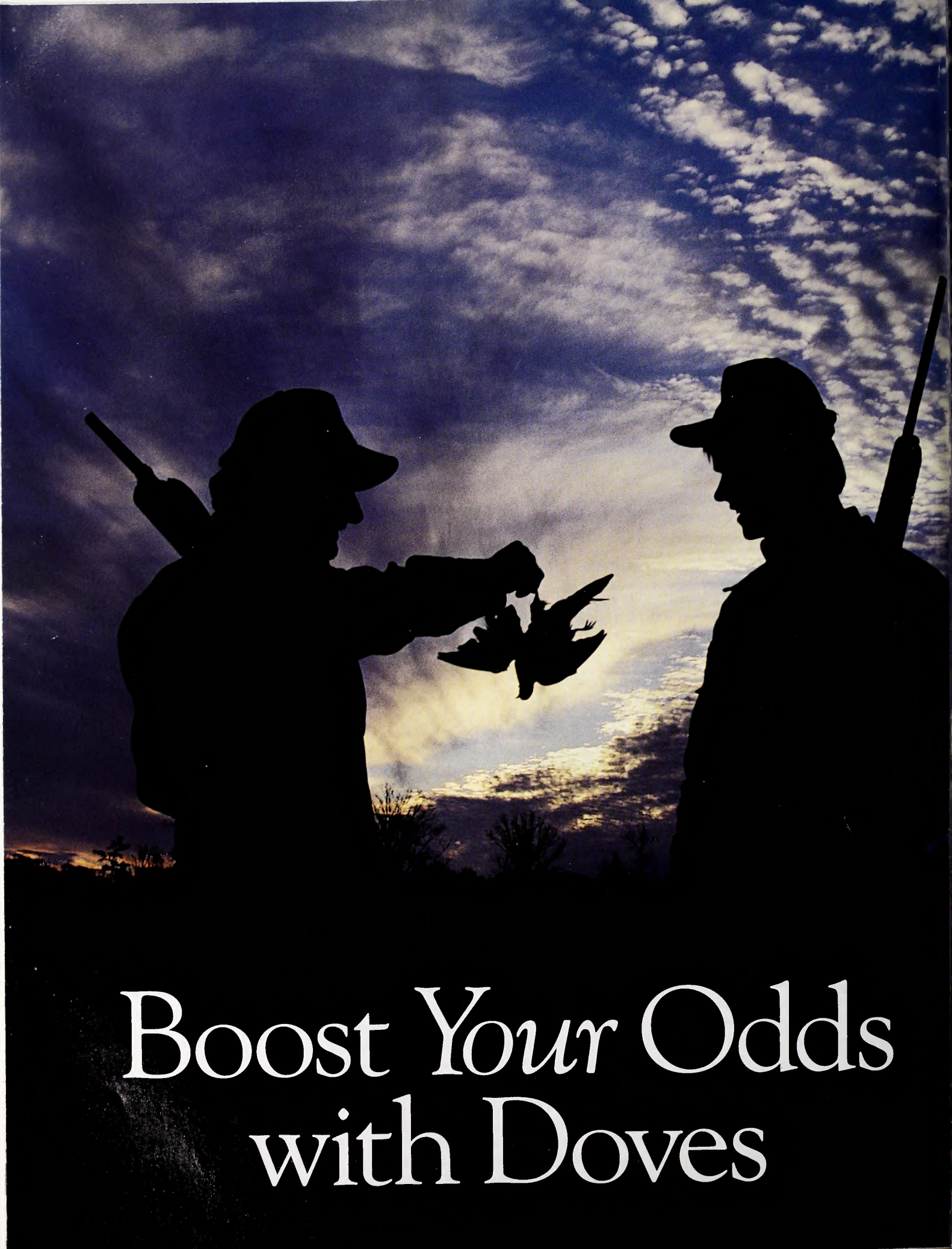
A bear's long elbow knob *functions like the fulcrum of a lever. Because of the knob's length, the force at the input end is about equal to the movement at the output or leg end. This gives the bear great strength but reduces its running speed.*



The wolf's elbow knob—*or the short end of its leg lever—is shorter than the bear's. Thus its output end moves faster than the bear's, although slower than the deer's. It runs faster than the bear but has less power in its legs.*



The elbow knob of *a white-tailed deer is the shortest of the three animals, like a fulcrum that is very close to the input end. As a result, the deer can run faster than the wolf and the bear, but has less power than either.*



Boost *Your* Odds with Doves

Want to take a limit of doves with a box of shells? Follow these simple tips and you just might.

written by David Hart ©1998
photographed by
F. Eugene Hester ©1998

I'm not sure who came up with the numbers, but it's said that the average dove hunter knocks down one bird for every five shots. That ratio can be debated, but after nearly two decades in the September dove fields, I don't doubt it. In fact, it may be a conservative estimate.

When it comes down to it, dove hunters —along with most others who spend only a few days in the field every year—are only fair shots. Easy incoming birds, a few slow-moving crossing doves and a scattering of other shots are the most likely ones to down, but every hunter gets lucky now and then and kills a distant dove or one pushed by a steady, hard tailwind.

There are plenty of dove hunters, however, who can down a limit of doves with a box of shells. That's right, 12 birds with 25 shotgun shells. Don't believe me? I wouldn't either, except I've done it myself. And not just once or twice. So has Mike Powell, an Oklahoma resident who happens to be my cousin and frequent hunting partner. What's even more amazing is that Oklahoma has a 15-bird limit.

Mike has spent much of his 35 years hunting the fields and forests of his home state, and over time has managed to become a pretty darn good shooter. Fifteen-bird limits sometimes come quick for him, although there are plenty of days when the empty hulls pile up at his feet and lots of birds pass without so much as a lost feather.

Practice, Practice, Practice

Nothing can open the door to good shooting and high success ratios like plenty of practice at the skeet and sporting clays ranges. The ability to hit a moving target

***Dove season typically** means it's time for many sportsmen to put away the rod and take up the shotgun. But after months of wetting lines, some hunters find that their trigger finger is out of practice, resulting in more empty shells than birds.*

with a load of No. 8 shot may come easy to some hunters, but most have a hard time figuring out exactly how far to lead a screaming clay pigeon or a dipping and twisting mourning dove. That's why there is no substitute for regular practice.

There is a certain science to calculating the exact distance you need to shoot in front of a moving bird, but most good shooters just do it. They don't think about it. They just swing the gun, pull the trigger and follow through. After countless hours and cases of shotgun shells at the skeet range, the motions and thought processes just come naturally.

I wish I could say my cousin has spent a lifetime burning powder at the shooting range, but I can't. By his own admission, Mike has shot about 20 rounds of skeet in nearly 30 years of hunting. Yes, when he was a boy, his dad threw clay targets with a hand trap, and that certainly helped. But the truth is that he's just a gifted hunter with a knack for hitting what he's shooting at.

I'm not, and the odds are neither are you. That's why we have to shoot our shotguns as much as we can so the actions simply become second nature. I wish there was a way around it, but again, nothing beats constant practice.

Pick Your Shots

"The number one thing I do when I'm dove hunting is just to pick the easiest birds," Mike said. "If it looks like it's going to be one of those days when the birds are flying real good, I just take my time, pass up the long shots and wait for the doves that come floating in to the field and present an easy shot."

That may sound like a no-brainer, but too many hunters just don't heed the tip and bang away at anything and everything that passes within 50 yards.

To get those easy shots, it's critical to find a good position along the edge of or within the field you are hunting. That simply requires a few minutes of patience before you set up. Or it means you have to be willing to pick up and move to a better spot. Keep a constant eye out for heavily used flight paths, and take up a position where birds slow down and prepare to land. That could be a dead tree, a bare spot in a field or an open spot along a fence line.

Mike also gave up on what many would consider "hot-dogging." Trying to knock down two close-flying birds with one shot, hitting birds soaring through the stratosphere and shooting randomly at twisting flocks of doves will almost always lead to a missed shot. Don't try a tough shot and you won't miss. It's really that simple.

What if the doves just aren't flying too well?

Desperate means sometimes lead to desperate measures, so some hunters empty their guns at every bird that passes within sight when the doves are scarce. I guess they have faith in that one golden pellet that just might hit the bird, break a wingtip and send the dove spiraling to the ground.

Besides blowing your average, shooting randomly at high-flying and distant birds is unethical. More than likely, you're going to miss, but many of those birds will fly off with a pellet or two in them and die a slow death.

Again, shotguns with modified or improved-cylinder chokes pushing a load of No. 8s have an effective range of only about 30 yards. No matter how many birds you shoot at, you'll never knock one down if they are out of range. Know your gun's outer limits and stick to them, no matter how easy a shot looks.

Find Your Birds

I'll never forget a hunt I participated in several years ago in Virginia. A half-dozen hunters, including a 14-year-old crack shot, were guarding a half-harvested cornfield. For some reason, the birds wanted to land in the section of corn that was still standing, despite the bare ground that was littered with golden kernels of freshly harvested grain in front of us.

We had plenty of shots, but most of the dead birds would fall into the uncut corn and disappear. Each time that happened, we would gently ease into the standing maize and walk up and down the rows until we found our dove. It usually took a few minutes, but perseverance always paid off.

The 14-year-old, however, couldn't stop shooting at incoming doves. He killed many of them and at one time had four or five birds down in the thick corn. He found only one of them. Self-restraint wasn't in his young blood. Despite an abundance of birds, he had seven doves in his vest by day's end and perhaps that many still in the cornfield. A small pile of empty yellow shotgun shells lay next to his stool. We helped him hunt for those lost birds until darkness forced us to call off the search. The foxes ate well that night, and a kid learned a valuable lesson. We made sure of that.

If he had taken the time to watch each bird fall and gone directly to where he last saw it, he would have finished out the day with a limit. Unfortunately, too many overanxious teen-agers don't realize the value of self-restraint. Too many veteran hunters also leave birds on the ground and then lose track of them as they keep banging away at passing birds.

That certainly qualifies as unethical hunting, and it probably balances on the edge of illegal behavior.

***Mourning doves are** migratory birds that congregate where food, bare soil and water are abundant. A recently harvested cornfield will likely produce a good dove shoot. Annually, about 100,000 North Carolina hunters harvest close to 2 million birds.*

***One of the keys to** taking a limit of doves is holding your fire until the birds come into range. Dr. John Wear, sitting with his dog and his harvest of birds, shows what good camouflage and a little patience can do.*

Patience, Patience, Patience

In addition to a regular regimen of practice at the skeet range, Mike suggests holding your ground until the dove is within range. Too many hunters, he said, fidget or even jump to their feet and throw their gun up long before the dove has flown into range. We've all seen hunters do that, and many of us are guilty of such actions. That clearly causes doves to flare, but hunters will often take the shot long after the bird has flown out of range anyway.

"I've gotten to the point to where I just sit still until the bird is right on the outside edge of my range," my cousin said. "Then I raise my gun and take the shot. If I miss, I rarely take a follow-up shot, because nine times out of 10 I'll miss that one, too. Going-away shots are difficult. If the doves are flying good, I know another one will come along soon."

If you can master it, try shooting from a sitting or kneeling position. If you can stand the odd looks from other shooters, try it at the skeet range. That removes that instant when you have to stand up, shoulder your shotgun and fire. Seconds count, even with incoming doves.

Know Your Gun and Its Limits

You've all heard stories of old-timers who knock down a limit of doves with 60-yard shots from full-choke, 32-inch barreled shotguns, but don't put too much credibility in those yarns. Most of the time, they are just that.

The best all-around dove gun is the one you are most comfortable with. Mike started hunting with a side-by-side 20-gauge but "upgraded" to a Remington Model 870 pump with the same bore size and equipped with an adjustable choke. That gun has been his constant companion in the field and has accounted for countless limits of doves. I'd bet my favorite shotgun he could outshoot an average hunter armed with the world's most expensive over-and-under.

The point is simple. Typically, a 12-, 16- or 20-gauge shotgun with an improved-cylinder choke is all you'll ever need for a day in the dove field. Sure, some hunters like a slightly tighter choke; others prefer their shotgun to have a more open one. The best hunters shoot their gun so much that they know it like an old friend. It doesn't matter what the gun looks like or how much it cost. What matters is the person who pulls the trigger. ⊠

Heads Up for Poachers

As the deer hunting season gears up, the Wildlife Commission's tough corps of enforcement officers polishes its skills for another dangerous year.

written by Chris Powell / illustrated by Jim Brown ©1998

A lone pickup crunches gravel as it eases off a deserted road, sweeping its high beams across a moonlit field. About 100 yards out, a single doe stands seemingly frozen in the rays of light. But she is not by herself. A camouflaged wildlife enforcement officer lies in a nearby hedgerow, clutching his two-way radio. Up the road and out of sight, a chase cruiser idles waiting for the signal. Thousands of feet overhead, an airborne spotter watches through night-vision optics as the scene unfolds.

The doe's tail twitches. Her reflective eyes turn momentarily away, then back to the light. Convinced she's real, the suspect eases his rifle out of the truck window and shoots. Simultaneously, the concealed officer gives the chase vehicle the green light. The poacher, thinking it was a clean miss, reloads and is about to squeeze off another round when he hears a car coming. Flashing blue lights—game over.

This sequence of events has become a familiar part of enforcement for the N.C. Wildlife Resources Commission. Poaching is considered one of the most serious wildlife offenses and is enforced accordingly. The

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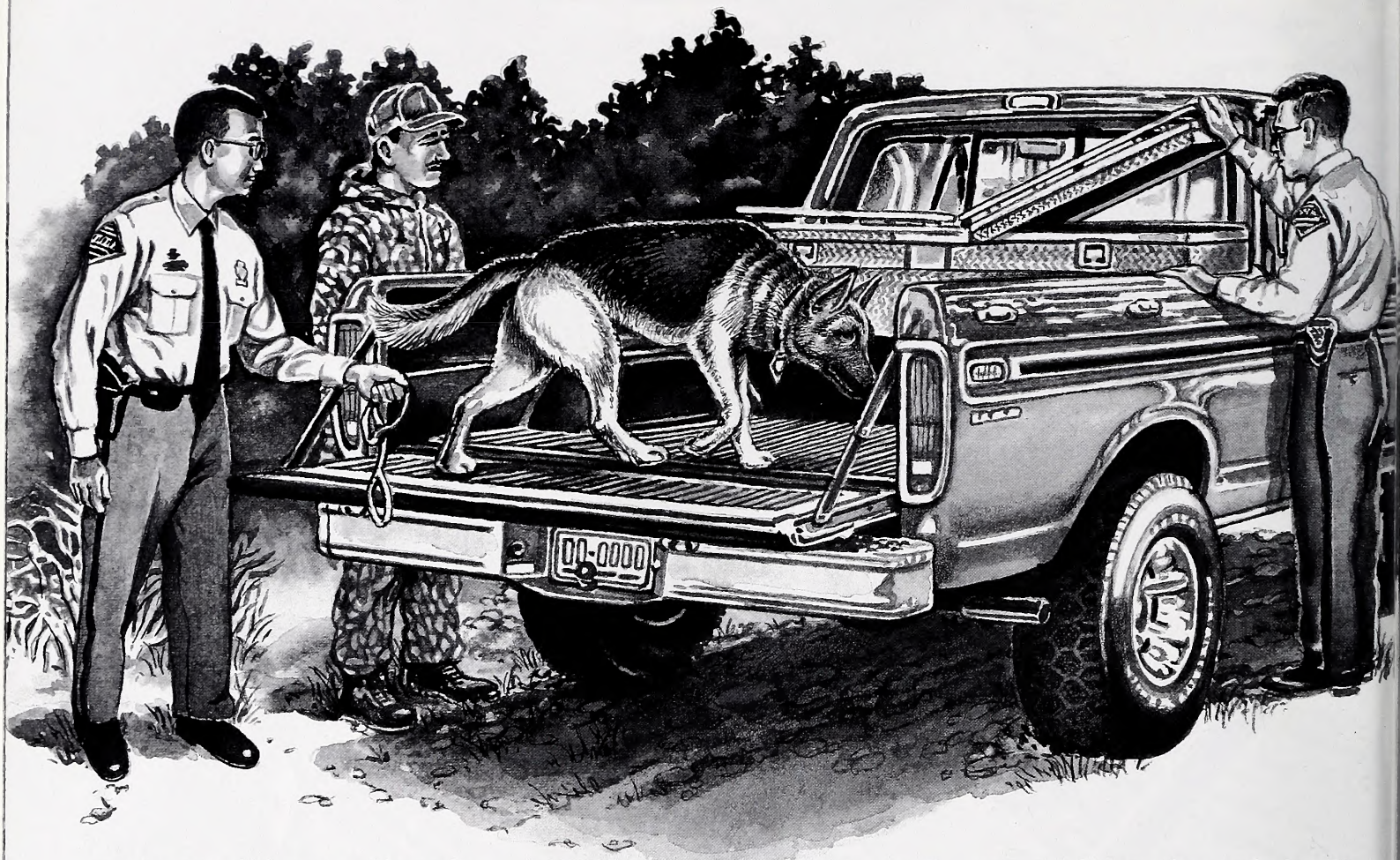


transgression, which can occur during the day or night, usually involves high-powered rifles being discharged from vehicles on public highways. The shots tend to be fired over wide expanses and have been known to occur near occupied houses. It is not unusual for these cases to involve alcohol or drugs. Combine all of these factors, and what results is more than a wildlife infraction; it is a total disregard for public safety.

"The average person riding around shooting at deer, all he sees is the deer," said Sgt. John Massey, who supervises the northcentral portion of the state including Alamance, Orange and Caswell counties. "He doesn't see the house behind the deer; he doesn't see the tractor behind it or anything. What we are after are people shooting from the roads on posted land. That is what we are concerned about."

While the vast majority of the 200,000 deer hunters in North Carolina are law-abiding, an active minority are not. Poachers shoot deer illegally for reasons ranging from mean-spirited target practice to the sale of venison and antlers for profit. These "outlaw hunters" are also motivated by a new trend —legal deer tournaments that offer cash prizes for the biggest bucks or does. "We have a store down here that had $3,000 in a big-doe contest last season," said 34-year-old Wildlife Officer Barry Joyce. "A man will do a lot of crazy things for $3,000. There was a contest one year, and they were giving away a new truck. For a $250 fine, some people will take a chance."

Illegal hunters aren't confined to any particular race, sex or age. Enforcement officers have arrested women, people who couldn't speak English, senior citizens and even a ring of high school kids who had "Poachers R Us" business cards printed up. There is no way to tell how many deer are lost to poaching incidents each year, but the number is probably high. During 1997 alone, the Wildlife Commission dispatch office recorded 785 complaints for night hunting.

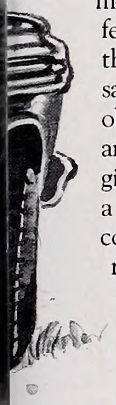
To deter illegal deer harvesting, the Wildlife Commission's enforcement division brings substantial forces to bear. During the course of a year, four planes will bounce around the state, providing ground units with an eye in the sky. The planes, two Super Cubs and two Maules, are equipped with state-of-the-art, night-vision equipment that, from thousands of feet above, can detect light sources as small as a lit cigarette. Needless to say, someone using a 100,000-candle-watt spotlight sticks out like a sore thumb. Also, more than 200 officers and eight canine units are on the lookout across the state. And the results of these combined efforts speak for themselves. Night operations last year alone resulted in 621 arrests. Of those that have been tried in court, only nine have been found not guilty. In addition, 60 deer carcasses were confiscated (most were donated to soup kitchens). And 219 shining-light citations—violations that do not involve guns—were issued.

Though poaching occurs year-round, the activity tends to increase during deer season, when the animals are on the move and interest in big game is the highest. "Poaching complaints tend to pick up in October; November is the largest month, and then they start to go down in December," said Curtis Thomas, a communications supervisor with the Wildlife Commission.

Wildlife officers prepare for deer season mainly by repairing their deer decoys, which is no simple task. Originally nothing more than foam silhouettes, the decoys have become high tech to stay a step ahead of wary poachers. Wildlife officers have incorporated real hides and horns, reflective eyes and even remote-controlled heads and tails, all of which get shot to pieces during a year of use. Last Thanksgiving, one decoy in Wildlife District Five was shot at by 25 separate groups of people. Another Commission decoy has been hit so much that it has earned the name Pepper Shaker. The hides and horns, which come from road-kill deer, are mounted

on the foam decoys by wildlife personnel, or taxidermists who donate their time. The heads and tails turn by small electric motors implanted in the neck and rear of the decoy. A hidden lawn mower battery powers the motors, which are operated by remote control.

Contrary to what some poachers have claimed, deer decoys do not constitute entrapment. The sting operations are conducted mostly by request of property owners fed up with poachers shooting over their land. The decoys are placed in safe shooting locations that are not obvious targets. Also, the antlers used are not the trophy caliber that could give even the most law-abiding person a case of buck fever. However, when it comes to making the deer lifelike, it's no-holds-barred. And like fishing, catching the quarry is all in the presentation. "When suspects stop their vehicle and that decoy's head turns and looks at them and that tail flickers a little bit, poachers can't stand it," Sgt. Massey said.



Such was the case when District Five officers were asked to aid a landowner who had had enough of one man poaching on his property. As the story goes, the landowner warned the suspect the night before Thanksgiving that wildlife officers were on the case and that he should stay away. Thanksgiving Day, wildlife officers set up the decoy, and the first person they caught was the forewarned poacher. But it gets better. "Then we catch the landowner who had originally called us; then we catch the landowner's father," Sgt. Massey said. "They don't expect it to look so real. They expect it to be a dummy-looking deer stuck out in the middle of a field. But that time, we put the decoy in the edge of the woods like he was walking out to a pretty wheat field. And it's morning time with fog in the air, and everything looks dramatic."

Being caught can be humiliating for the poacher, but the misdemeanor violations can carry some stiff penalties, too. The minimum fine for hunting at night is $250 plus court costs; substantial attorney's fees are usually levied as well. If an actual deer is killed, the poacher must pay the deer's replacement cost to the tune of $279 (if you think that's high, a turkey costs $750). Shooting out of a vehicle's window can result in charges of hunting with the use and aid of a motor vehicle. In most counties, that also means charges of hunting too close to a public right-of-way. Often poaching occurs without permission, so there can be charges of hunting on posted land and trespassing. If a person has a hunting license, he or she can lose the privilege for up to two years. Finally, any weapons used can be confiscated, even if the weapon is a brand-new truck.

"We had a decoy set up one night about 11 o' clock on a dirt road down in Orange County," Joyce said. "A vehicle came down the road, turned sideways and put its headlights on the decoy. And we waited for gunfire. A couple of minutes went by, and there was no shot. All of a sudden, the driver floored the accelerator, jumped a ditch, took off across the field and hit my decoy running about 50 miles per hour. The decoy's head flew up in the air, and everything went everywhere. They got out to load the deer up, thinking they had hit a real deer. We ended up towing that vehicle, and they lost it."

Catching deer poachers can be exciting for wildlife officers, but the hours are long and the work, at times, can be dangerous.

"A vehicle came down the road, turned sideways and put its headlights on the decoy...A couple of minutes went by, and there was no shot. All of a sudden, the driver floored the accelerator, jumped a ditch, took off across the field and hit my decoy running about 50 miles per hour. The decoy's head flew up in the air, and everything went everywhere. They got out to load the deer up, thinking they had hit a real deer."

None of the officers ever forget that they are dealing with suspects who are armed with high-powered weapons, facing serious charges and sometimes under the influence. Being a wildlife enforcement officer means constantly placing oneself in precarious situations. And almost all officers have had a hair-raising encounter.

"We had a guy shoot at us one night about 10 years ago," Sgt. Massey said. "We walked up on him and he had the rifle on us, and I just threw my hands up and told him to put the rifle down, all we wanted to do was talk to him. And he just said, 'Naw, I got you covered.' My partner had his flashlight on and he cut it off, and the guy backed up and started shooting. I didn't feel anything hit around me, but he shot probably six or seven times. Then he took off running through the woods. I made sure the other officer was all right, then we called the Department of Correction and got some tracking dogs. And we caught him."

Unlike police or Highway Patrol officers, who can call for almost instant backup, wildlife officers are usually far from civilization and may be miles from any assistance. Because of this, wildlife officers must rely on a cordial, yet firm manner of law enforcement. "If you treat people with respect no matter what they have done, most of the time they will calm down and do what you need them to do," said 33-year-old Wildlife Officer Todd Kennedy.

The investigative techniques used by wildlife enforcement officers also greatly differ from those of other law enforcement agencies. While police typically arrive at a scene after a crime has been committed, wildlife officers usually witness the violation taking place. Very little, if any, circumstantial evidence is ever used by wildlife officers in court. When dealing with cases like deer poaching, officers use video surveillance, still photographs, measurements, diagrams and often their own testimony. But even with concrete evidence of guilt, Sgt. Massey said he has seen outlaw hunters get off or get slaps on the wrists by court systems that do not recognize the gravity of poaching violations. "For us to catch somebody, we have to lie in the ditches and in the woods and under adverse conditions and watch the crime happen," Massey said. "It gets pretty frustrating when you do catch poachers, and the court treats it like it is kind of minimal."

Indeed, the work of a wildlife enforcement officer is no walk-in-the-park. The job often requires weekend and holiday work that begins with extremely early mornings and ends with equally late evenings. An officer might find himself or herself blistering on a summer boating patrol or freezing in an early morning duck marsh. And the culmination of all this effort can sometimes be anything but gratifying. Given all these factors, one might wonder why any person in their right mind would want to become a wildlife officer.

The reason is clear for Kennedy, who summed up the enforcement division's motivation: "If we are not out there protecting the resources, who is going to do it?" he said. "We may not catch the majority of the people poaching and violating other laws, but a lot of them know there is a chance they are going to get caught. We are out there as a deterrent. This is something you have got to love to do." ⊠

COOL MOVES *for* HOT WHITETAILS

Hunting in the heat poses special challenges. Here's how to make the best of September prime time.

written by Mike Gaddis ©1998

The afternoon sun hangs eye level, a white-hot medallion in a brassy sky. Motionless, I bear the brunt of it, only a few ineffectual leaf clusters as helpmates. The air is stifling and lifeless. Even the cicadas have taken a breather. Behind me the white trunk of the big poplar catches the relentless, scorching fire of the radiated heat, returning it angrily against my neck and shoulders. I feel like a sausage on a rotisserie.

Sweat pours from my hairline, trickles down my forehead, seeps into my eyes. My coveralls are soaked, pasted to my skin like a steamy blanket. The itching burn on my hands reminds me the no-see-ums are lusty, and a double hover of mosquitoes are bent on a kamikaze mission against my earlobes. I check my watch again. Two long hours before the deer move.

I ask myself honestly, "Am I really enjoying this?"

I have acquaintances that simply refuse to hunt when the thermometer tops 80 degrees.

"Masochism is not on my joy list," they contend. "Call me in November."

I don't enjoy sweat and bugs. Indeed, you would be pressed to find anyone who despises them more.

Thing is, during the early weeks of the bow season, some of the biggest deer are taken—undisturbed bucks lulled into the relative assurance of a September feeding pattern. Examine the Pope and Young bowhunting records; the potential is every bit as real as the weather is hot! Missing it is a heavy price to pay.

The special demands of hot-weather deer pose five challenges:

- optimizing personal comfort
- countering the greater presence of human scent
- reducing the distraction of biting insects
- staying alert despite the sultry air
- safeguarding downed animals from spoilage

If, like most of us, you don't especially fancy the music but don't want to miss the dance, here are some cool moves for hot whitetails.

***Though the heat and** humidity of early-season deer hunting can be challenging, the chances of taking a trophy-sized buck during this time are as good as they get.*

WILLIAMS LEA

Personal Comfort

Remaining comfortable in a September swelter is a tough assignment, but try a two-piece suit of nylon mesh or snag-resistant poly/cotton. Nylon is pig-hide tough; poly/cotton is a bit more comfortable against the skin. The jacket (with hood and face mask) and pants are feather light but formidable enough to offer some protection against briers and brambles. Air circulates freely through the open mesh, allowing maximum cooling.

Under it, wear *only* a pair of summer-weight hiking shorts, with lots of cargo capacity to help with billfold, knives, calls, gloves, compass, string and all the other sidebar gear that commands so many pockets. A small strap-on belly pouch will handle a flashlight, screw-in hooks, water bottle and safety belt. It is also cooler than a backpack. On a real barn burner, I immerse the whole suit before I go in the woods. It absorbs very little water actually, just enough to provide a subtle refresher amid a faint breeze. Likewise, it allows perspiration to evaporate more readily, retaining very little in the fabric. You never reach that grungy soaked-to-the-skin stage.

You can order one of these suits from any of the major hunting supply retailers for $40 to $65, in the latest camouflage pattern. For the foothills, Piedmont and western Coastal Plain, it's the best thing I've found for wresting the comfort meter back toward bearable.

A tennis friend suggested I add a terry cloth brow band to keep the sweat out of my eyes. It has worked quite well. Bleary, burning eyes and small sight pins don't marry well.

I would be the first to admit this system has limitations in the swamps and pocosins of the deep Coastal Plain. I'm tough, but on my war map those places are marked "no-mans-land" until frost.

Scent Control

Beating that choke-bore nose is always the number one trick in taking a deer. Sweat and swelter aggravate the proposition tremendously, elevating the production and sloughing of body scent. Moreover, heat and humidity bind and concentrate human odor, airborne or ground-borne. On still, stagnant days, it hangs heavily on the hyper-heated air, tends to descend and lingers for hours.

The problem is twofold: controlling and masking the presence of body scent to the extent practical, and since it is impossible to totally eliminate the dispersion of body odor, contriving the placement of your ground trail into and out of a

KEN TAYLOR

One of the best ways *to avoid detection by deer is to reduce your scent. By raising your tree stand an additional 10 feet during hot weather, you can effectively raise your scent stream above the deer.*

hunting area. A successful strategy consists of the following elements:

Hygiene. The battle starts from the skin out. Bathing with a deodorizing soap or soaking in diluted baking soda before you hunt should become religion—morning and afternoon, if feasible, on sultry days. The white-tail industry is rampant with "scent-away" soaps, but the additional cost of the specialty products isn't a necessity. Any house-brand deodorizing bar will get the job done, as long as you stay with the unscented variety. Same goes for shampoos and deodorants.

Bathing doesn't make you bulletproof. The minute you hit the outdoor sauna, you start emitting scent again. But it does prevent residual buildup and, for a time, dampens the intensity of the odor produced.

Clothing. Here again, light mesh fabrics are a boon. The increased venting retards retention and concentration of perspiration in the garment. There is less scent to drift around like a heavy cloud on a humid day.

Technology keeps trying. Scent Lok—charcoal-laminated 7.5-ounce poly/cotton lightweights—claims to lock up human scent and deserves mention. If washed frequently, these clothes add margin. A complete suit is pricey, though, and a questionable selection on a really hot day.

Whatever your choice, wash hunting clothing often in hot weather using an unscented detergent. Between trips, hunting garb is best kept outdoors in a dry place open to airflow free of extraneous odors. Or store it in a clean, plastic bag that acts as a barrier to external contamination. Toss in fresh, crushed pine or cedar as a natural deodorizer and cover scent. Throw your caps, face masks and packs in also. Boots can be freshened with baking soda once or twice a week.

I have a trusted trophy-hunting friend or two who vouch for commercial scent shields and neutralizers, sprayed over outerwear. Frankly, that's contrary to the majority of opinions I receive. Anything that comes in a bottle and purports to eliminate human scent, absent an unbiased consumer report or an underwriter's label, draws skepticism. Likely, some products do help. Time and again, however, I have watched good bucks about-face at a ground trail supposedly masked by a scent shield.

Rank covers—skunk, coon and fox musks—still do not overcome the cascade

of human scent from the upper body. Altogether, potent yet pleasant natural covers—earth, cedar, pine—seem a better choice. All occur abundantly in North Carolina whitetail habitat, and all are free. It takes only a minute to crush a handful of pine needles or cedar leaves over body and boots.

Since fabrics soak up odors in hot weather, it's a good idea to keep outerwear and boots stored in a bag on the back seat until you reach your hunting destination, particularly if you have to waylay at a service station. Service stations are notorious for three of the top four on the bad list: gas fumes, oil residue and cigarette smoke.

As to footwear, there is a solid case for rubber knee boots. They don't breathe as freely as cordura-shinned leathers, but for the same reason they minimize the intensity of your ground track.

Hunting strategy. Hunting tactics must offset, to the extent possible, excess body scent and its extended residual life in the air and on the ground.

Tips:

- Raise your scent stream by adding 10 feet to tree stand height. If you normally hunt at 15 feet, go 25 feet. Wear a safety belt!
- Carefully pre-plan routes to stand sites. Approach a stand at right angles to the expected travel of game, so that you cut the key trail only once, within bow range. When hunting fields, walk the center of the field to a spot parallel with your stand, then cut in at a direct right angle.
- Mark stand routes well so you can find them in a dark, leaf-shrouded predawn without floundering around.
- Allow plenty of travel time to stands. Don't rush or loiter. Just ease along steadily and minimize sweating.
- Wade waterways where you can to drown your ground trail—another good argument for rubber knee boots.
- Don't linger around stand sites after the hunt; leave the area the same way you came.
- Stay away from prime stands, particularly morning stands, on hot, breathless days when the ground is saturated, the leaves are dripping and the air is oppressively muggy. If you're working a big-time buck, the risk of detection is too great.

Wind. First, last and forever, hunt with the wind in your favor, not against it. Use a small puff bottle of cornstarch to check minute breezes on seemingly dead days. No matter how diligent you are in masking your scent, it's counterproductive to place your scent stream directly upwind of a mature buck, particularly in the months before the rut addles its judgment.

Insects

Mosquitoes, gnats, biting flies, chiggers and ticks are hell's own mischief during hot-weather hunts. Endure as you may, sooner or later a good repellent is the better part of valor.

The latest permethrin-based repellents, such as Permanone and Duranon, sprayed on clothing (not on bare skin) and allowed to dry before use, boost the natural bug-taming qualities of close-weave or double-layer mesh into a formidable system for thwarting blood-thirsty insects. Once dry, these substances are virtually odorless and long lasting. Skin-safe repellents masked with earth scent are available for added protection.

If your scent stream is downwind of prevalent deer routes, repellents do little to give you away while greatly aiding comfort.

Don't forget poisonous snakes, mainly copperheads and rattlesnakes. Gaiters, chaps or knee boots are good insurance. Be especially watchful following a blood trail through thick cover on a summer night. Kneeling, turning leaves, climbing creek banks or scrambling over logs place hands, trunk and face close to the ground.

Staying Alert

Each deer season, hunters die or are maimed in falls from tree stands. A hot afternoon with the sun streaming in increases the likelihood of an accident. Experienced hunters, honest with themselves, know the syndrome. You allow yourself to drowse in and out of a stupor, feel yourself abruptly off balance, then jolt suddenly upright. Momentarily frightened, heart pounding, you try to figure where you were the last few minutes. Too close.

With open, lock-on stands, it's a particularly dangerous situation. Don't take it lightly. Wear a safety belt, cinched high enough on the tree that the force of its arrest won't pinch your breath off or crack ribs if you do fall. Keep your mind busy. Visualize a season-making buck standing just outside your arena of perception, totally wired and deciding whether to proceed or withdraw. Play through your shooting regimen.

Stay alert!

Safeguarding Your Kill

The task of safeguarding your kill begins with the shot. It's another measure of a hunter's ethics. A well-placed shot not only respects the animal whose life you will take but is also the best protection you have against losing a freezer full of prime protein.

Dr. Dan Carroll and colleagues at the N.C. State University School of Food Science advise that "an unattended deer carcass exposed to an ambient temperature above 80 degrees has a body cavity temperature of 100 degrees or more. All that heat accelerates the fermentation process. The flavor of the meat can be compromised in as little as two to four hours."

Seasoned bowhunters, extremely conscious of high-temperature hazards, allow themselves only high-percentage shots likely to be quickly fatal. All, at one time or another, have suffered the anguish of losing a wounded deer.

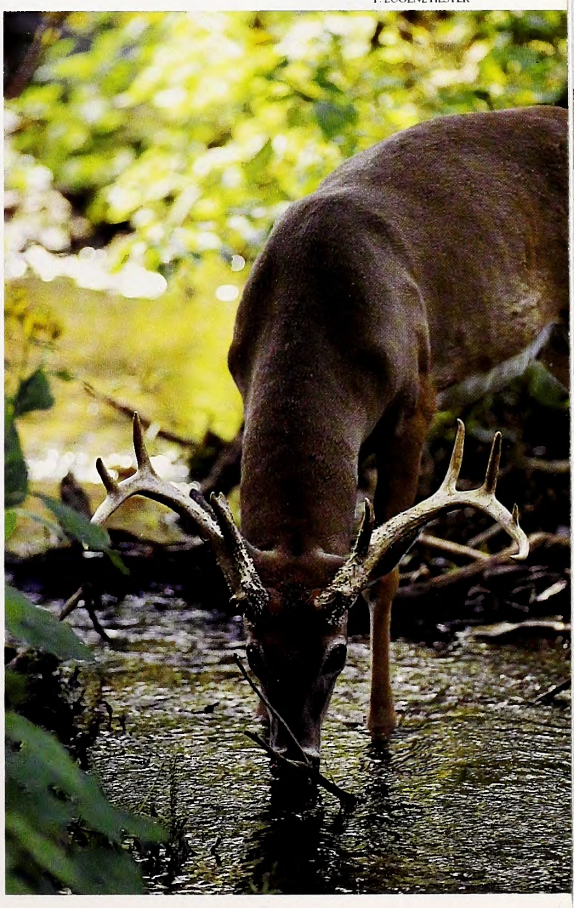
They know also that even a mortally wounded deer, bleeding internally, may leave only a faint ground trail, and that ants and beetles can hopelessly obliterate a meager blood trail within a few hours. Contrary to cold-weather logic, their attempts at recovery begin almost immediately.

Once down, a deer should be field dressed, cooler hung or quartered and iced as quickly as possible.

Trophy capes should be promptly iced or frozen. Taxidermists caution that a cape left to the heat will shortly spoil, and the hair will slip—once that happens, it is ruined and cannot be effectively salvaged.

All said and done, huntin' in the heat's like courtin' in a closet. Either way, you get steamed, but the prize is worth the pain. ⊠

F. EUGENE HESTER



Insects and heat *can be distracting in September, but the rewards of early-season deer hunting—big bucks—shouldn't be overlooked.*

Too Many DEER?

An Interview with Scott Osborne

MELISSA McGAW

When the white-tailed deer population peaked at 1 million several years ago, some people wondered whether North Carolina's deer herds had gotten out of control. In a wide-ranging interview with *Wildlife in North Carolina*'s editors, Scott Osborne, the Wildlife Commission's big-game coordinator, discusses the challenges of managing a growing deer population in a fast-growing and urbanizing state.

Q WILDLIFE IN NORTH CAROLINA: *Scott, several years ago the N.C. Wildlife Resources Commission estimated the state's white-tailed deer population at close to a million. Looking into the future, is this a sustainable population? Put in simpler terms, do we have too many deer?*

A SCOTT OSBORNE: Well, we had a million deer in North Carolina a couple of years ago, but that was a temporary thing, because since then the population has dropped back to about 900,000. Of course there are lots of local variations. In some places deer herds are on the increase, and in others deer herds are declining or stable—places with poor deer quality like our mountains, the flatwoods, the Sandhills and so on. But based on the habitat available to deer, it's reasonable that we could sustain that number over time.

Q WINC: *There is an impression among many people in North Carolina that we're overrun with deer. So you're saying that statewide we have enough habitat for them?*

A OSBORNE: I think too many people today—even some sportsmen—think that deer are just a bunch of pests, a bunch of varmints. What people tend to forget is that there has been a tremendous amount of hard work associated with restoring the white-tailed deer in North Carolina. And of course the North Carolina story is the same as the story of South Carolina or Pennsylvania. The sportsmen paid for this restoration, and we worked hard back in the 1940s, '50s and '60s to tell people to protect them, protect them, protect them. The fact that we have so many deer should be viewed as a significant wildlife success story rather than as a wildlife-pest story.

The statewide picture that you're talking about can be mighty misleading if you live in western North Carolina, where there are not a whole lot of deer. It can be misleading if you live in Halifax and Northampton counties which have got high deer numbers and high recruitment. So again, you have to think about the local variations. But generally speaking, on a statewide basis we have enough habitat for the number of deer in the state.

Of course, I'm talking mostly about the biological carrying capacity of the habitat—food and cover and so on. The new ball game today is the social or cultural carrying capacity, and that varies so much from area to area. When you start getting in suburban and urban settings, not only do you lose habitat, but you lose tolerance from the people to have very many deer. So it's kind of hard to say what's reasonable in the future. Certainly the habitat is there for deer to survive in good numbers, but I don't know if the attitudes of the people are there to have that many deer.

Q WINC: *How do you explain the difference in attitudes toward deer between people in rural areas and those in suburban and urban areas?*

A OSBORNE: Well, to answer that takes a little bit of history. Back in the teens, 1920s and 1930s, deer reached their low numbers in the state—about 10,000. Before European settlement, I suppose there were about a half million deer here. It wasn't overhunting, per se, that had knocked them back; it was unregulated hunting—no seasons, no bag limits, no restrictions, no enforcement, no Wildlife Commission. As a result, what we were left with was deer

primarily in the major coastal river drainages—the Neuse, the Chowan, the Cape Fear, the Roanoke river valleys and the swamps associated with them.

In the Mountains, some of the earliest restoration work was done on private lands, most notably what is now the Biltmore Estate, which was the old game preserve of the Vanderbilts. That was really the source of a lot of our mountain deer. Most people don't know that the Wildlife Commission didn't get started restoring deer until right after World War II, in the mid to late 1940s. And there were very few restoration areas in the Piedmont. Most of what is now our Piedmont deer herd has migrated from Virginia and South Carolina and our Coastal Plain and Mountains where deer were stocked.

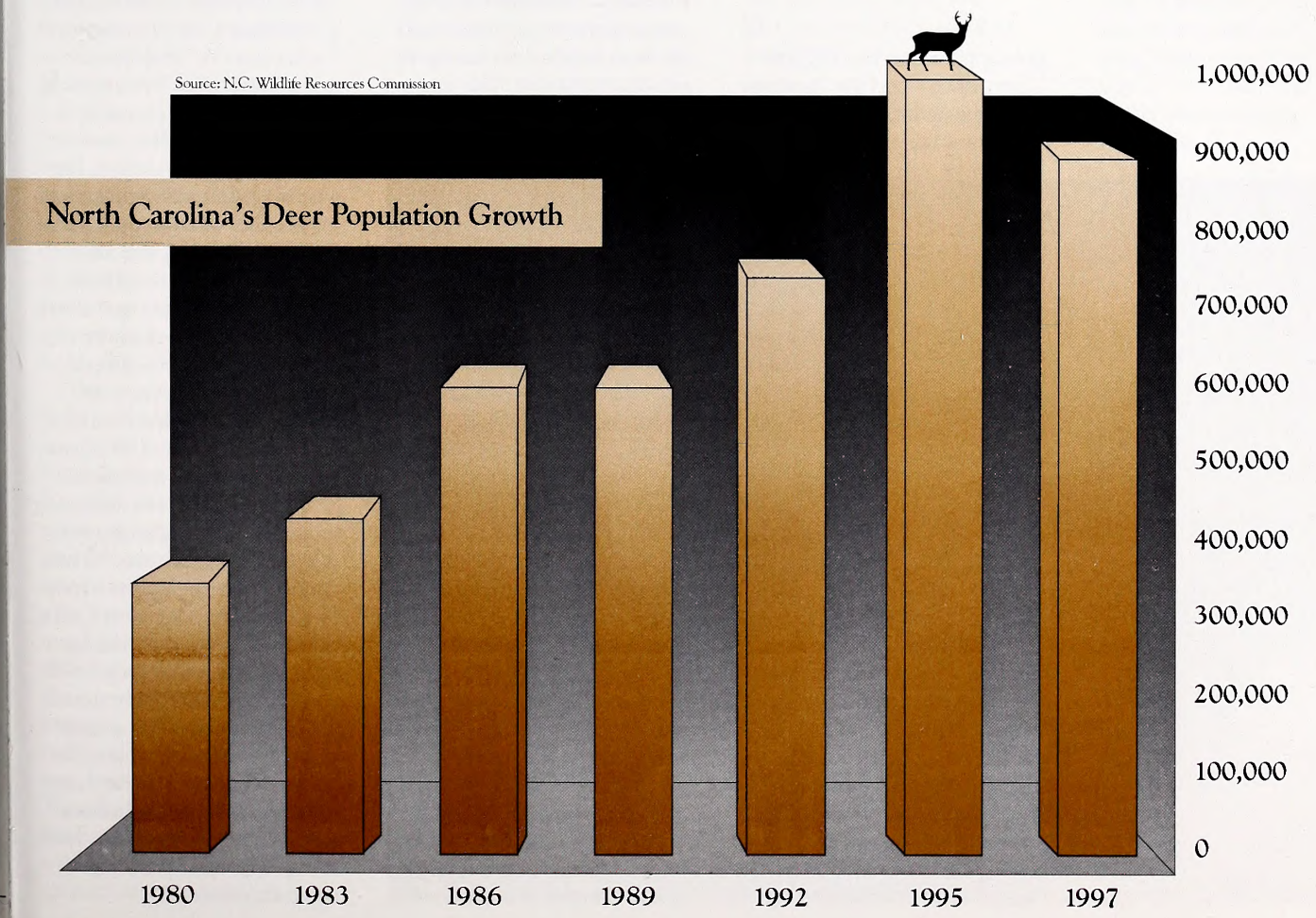
It's been only in the last 15 years that we've gotten high numbers of deer in the Piedmont, where all the people are. Ironically, the Piedmont has probably some of the best habitat left in the state—we could support a lot of deer in the Piedmont—but, again, it's also where all the people are. And that's where the conflicts come from—whether it's deer on highways, in backyards, in gardens. The old conflicts between deer and people historically were down east where the animals damaged corn, soybean and peanut crops. Those are the easier problems to deal with because deer are pretty easy to manage. We know enough about deer so that we can regulate numbers and prescribe the harvest and this sort of thing, to lower, maintain or increase numbers.

But the management challenge today is how to deal with the social carrying capacity—what people will tolerate—and that ranges from people who want to get rid of all of the deer to sportsmen who want even more. Since the Wildlife Commission is responsible for managing the state's wildlife, we've got to try to combine all these different perceptions of how many deer are enough into some reasonable population goals and then have management schemes that will allow us to manage for those numbers.

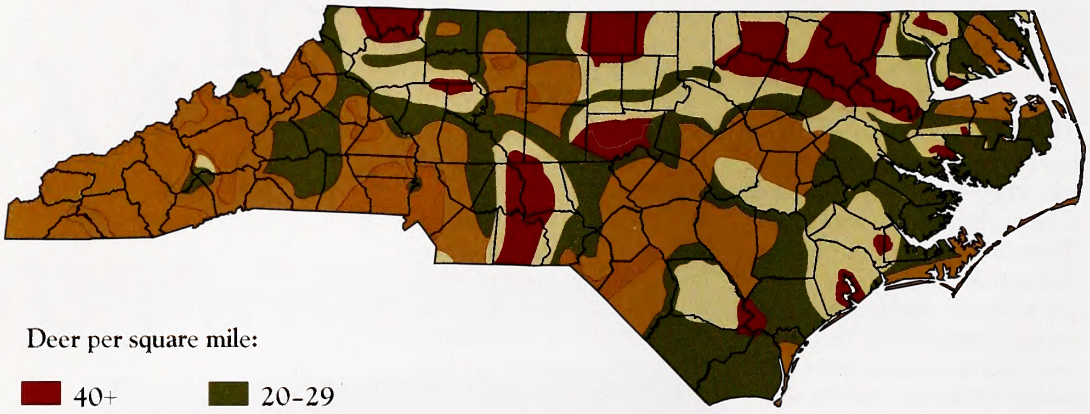
Q WINC: *What kind of "management schemes" are you talking about?*

A OSBORNE: Well, hunting is still our preferred management option with deer populations. We can easily manage deer in rural habitats by manipulating the hunting seasons and bag limits. That's a piece of cake. But because of local restrictions dealing with the discharge of firearms, because of conflicts between hunters and landowners, because of safety concerns and because of habitat loss, traditional hunting cannot be used in suburban or urban settings as easily as it can in rural settings. What you do is go into some of these communities and involve landowners, homeowners, the

***Since 1980, the deer** population in North Carolina has almost tripled under progressive management practices. Though some worry that there are too many deer, biologists are more concerned with the increasing conflicts between a booming human population and a healthy deer population.*



North Carolina Deer Density Map



Source: N.C. Wildlife Resources Commission

***Some areas in the** state support many more deer than others, as the map shows. In most cases the difference between the densities is explained by the quality of the local habitat and the nutritional values that deer can obtain.*

police as well as the Wildlife Commission. You have meetings and come up with alternate management schemes such as contraceptives, trap and release, deterrence and fencing.

Q WINC: *How effective are these alternatives in terms of managing the deer population?*

A OSBORNE: Trap and release can be done, but it's very stressful, and survival rates are not very good with trapped deer. And where do you put the deer once you trap them? We've got deer in every county of the state. Some communities in the northeastern United States are using sharpshooters to go into urban or suburban neighborhoods at night with rifles and silencers to remove deer. Some police departments are using that method now.

Contraception is another method. You hear people say there aren't any contraceptives for deer, but there are. They are available and they work. The problem is administering them to wild deer. Say you go out and dart a doe; well, you've got to go back and do it again next year. They're not for the life of the deer. One thing that offers a lot of promise is immunocontraception. Immunocontraception works sort of like an antigen-antibody response with vaccines. The antigen in this case is sperm from a buck, and the does build up antibodies to attack that sperm. The neat thing about it is the doe gets a booster shot once a year when she comes into heat and is bred by that buck. It's just like you getting a flu shot each year. There's a lot of promise there, but I don't want to too actively promote this right now because it's still in the research phase.

Bow hunting has also been employed in these situations. In Minnesota, for example, there are a lot of suburbs around the twin cities where citizen task forces are provided with a list of qualified, certified bowhunters. They interview the hunters. And then they set up restrictions regarding the time of day of the hunt, the day of the week, how far you are from a home, things like this. The reason they are going to bow hunting is that the other alternatives, though they have been used in many situations, just haven't been effective.

I guess the other thing that has to be done in this management process is to increase the tolerance level of landowners and homeowners. If you buy a 2-acre lot out in the country and you want to enjoy the pleasures of country living, then you have to put up with wildlife.

Q WINC: *North Carolina is changing from a mostly rural state to an increasingly urban one. How big of a challenge is this going to be for wildlife managers in the future?*

A OSBORNE: Not long ago, I spoke at a homeowners' meeting at a large development on the coast where they have deer problems. There were about 140 people who own $500,000 houses and $200,000 lots. I asked how many had grown up on a farm or had parents who grew up on a farm. These were people in their 50s or 60s, and I expected just about every hand to go up, but there were only two or three. They were mostly retirees from other states.

This is a big challenge for deer managers. My good friend and noted deer researcher Dr. Larry Marchinton has labeled it "urbanism" as opposed to "urbanization." Everybody understands what urbanization is. You have development and it takes away habitat; you've lost trees, water and food. But what we have today is an increasing number of nonsportsmen in North Carolina who have no ties to the land and little understanding of life-and-death relationships—predator-prey relationships and this sort of thing. They've never seen Grandma go out and cut the head off a chicken. This is part of what urbanism is all about.

Aldo Leopold, the father of modern wildlife management, said something like this: "There are two spiritual dangers in not owning a farm; one is supposing that heat comes from the furnace, and the other is that milk comes from the grocery store." The more we see that attitude expand in North Carolina, the harder it's going to be to manage deer traditionally by hunting, because people don't think it's an appropriate management alternative.

"THE MANAGEMENT CHALLENGE TODAY IS HOW TO DEAL WITH THE SOCIAL CARRYING CAPACITY —WHAT PEOPLE WILL TOLERATE."

Many states have seen declines in the number of hunters, even deer hunters. And it's alarming because the amount of federal-aid dollars the Wildlife Commission gets for managing wildlife is based in part on the number of hunters we have. Our deer hunter numbers in North Carolina are stable—we survey every three years—but what we see is an older age structure. We're not recruiting the young folks. So at some point in time, when older sportsmen die, we'll be in real trouble. That has to concern us.

Most people in North Carolina concur with the concept of hunting to regulate wildlife numbers. But as urbanism continues to expand and develop and if we continue to lose hunters, we may lose hunting as a management tool.

Q WINC: *So as the urban and suburban population grows, as the rural population declines and as fewer kids are initiated into hunting, there are some serious wildlife management implications. Is this a nightmare scenario for you?*

A OSBORNE: It's kind of a nightmare scenario for me because I feel more comfortable with traditional approaches to managing deer. I mean, shy of some major disease threat, the deer are not going away. The challenge is going to lie in developing contacts with the new user groups—these citizen task forces that I've talked about.

We've got anywhere from eight to 10 chronic problem areas across the state where our district biologists are having problems with deer. We need to have more proactive alternatives available to us so the biologists can be more involved and have a little more help in terms of managing these deer. I've talked with Randy Wilson in our nongame and endangered wildlife program about this because it's really an urban wildlife problem. I think when and if some Teaming for Wildlife (a national initiative to raise money for wildlife and wildlife related recreation) money becomes available, it would be wise to assign somebody to deal with these communities.

We're managing and providing technical guidance in these urban deer situations using Pittman-Robinson money, which comes from taxes on equipment bought by sportsmen. Part of the relief has to come from landowners and homeowners, not only to change their tolerance level but also to open their pocketbooks a bit so there can be a source of funding. The Wildlife Commission should be a key player in that, but right now this effort is costing us in terms of time and money and so on. These other groups have got to help themselves a bit, too.

That's what I like about these citizens task forces—you've got the municipal representatives, the police, homeowners, wildlife departments and the citizens. They all sit down and talk about what's possible in a given situation. You get this group involvement. Nobody has veto power, no one group or constituent has any more votes than another. The wildlife department lays the ground rules as far as what can be done and what kind of alternatives we can accept. We're not going to tell you you need to use sharpshooters, or that you can only use bow hunting or contraceptives. But we present a list of the things we will allow. Then they all sit down and come to some agreement among themselves about what will work best.

Q WINC: *Have you set up any of these task forces here?*

A OSBORNE: We have two that I have dealt with. In Nags Head Woods, in Dare County, it was the Wildlife Commission, the Nature Conservancy (the owners of the property), the two police departments (Nags Head and Kill Devil Hills) and a homeowners group. We have had several meetings and we agreed on a strategy, and we started hunting the Nags Head Woods area. We gave them a special deer season. We've done the same thing in Landfall, a residential development just outside of Wilmington.

Q WINC: *So you've had to come up with some innovative ways to deal with this problem.*

A OSBORNE: Well, as I said, barring some catastrophic event, it's something that will be even more challenging down the road. ⊠

***With the numbers of** deer and people escalating in many suburban areas, especially in the Piedmont, new approaches to deer management are being developed. Hunting is still the preferred way to manage deer herds, but in areas that have been densely developed traditional hunting may well have to take a back seat to alternative management schemes.*

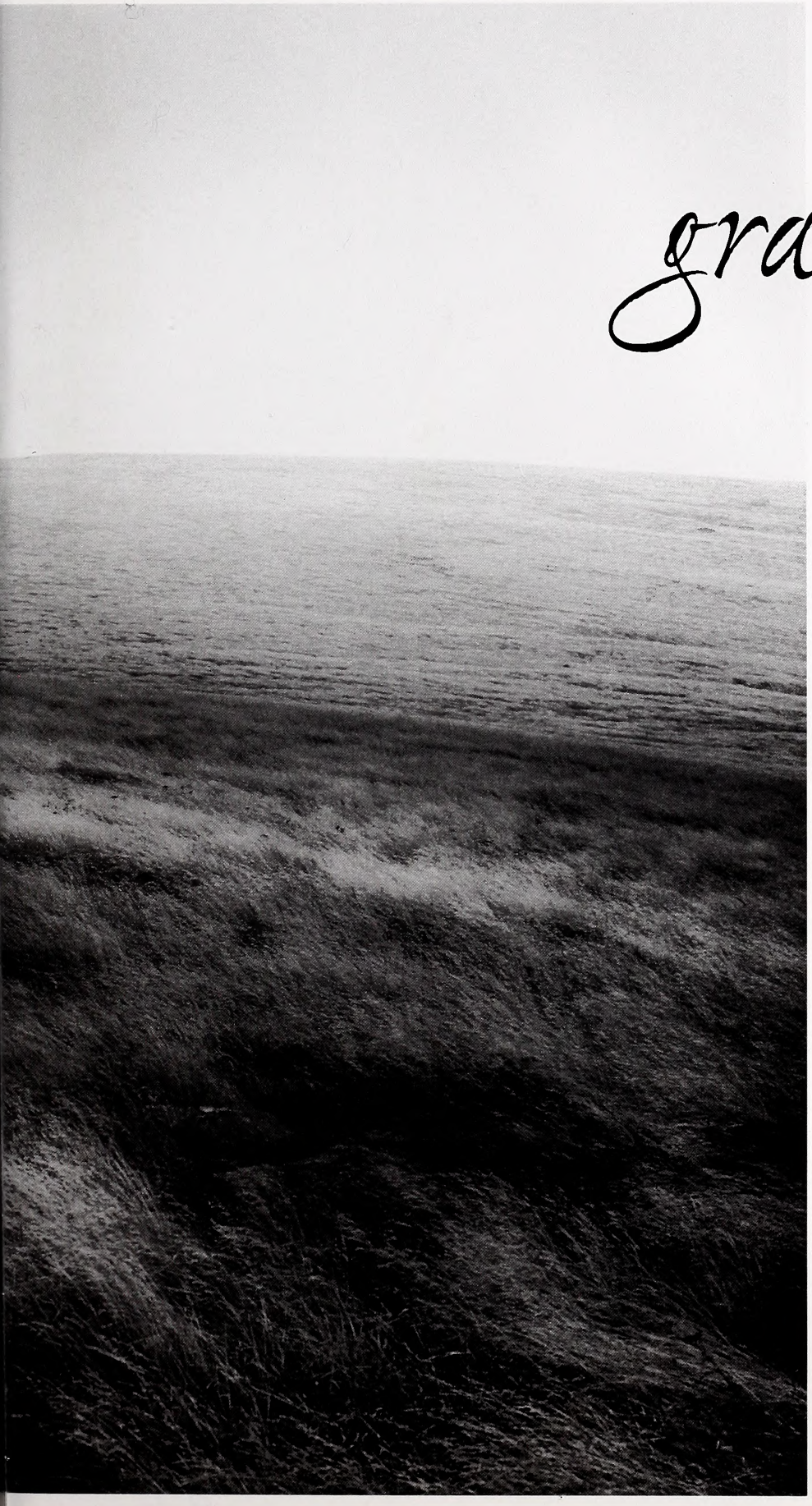
KEN TAYLOR

NORTH CAROLINA
Hunting Seasons 1998–99

Species	Hunting Season	Daily Limit	Possession	Season
CROW	Thurs., Fri., Sat. of each week from June 1 to Feb. 27 plus Labor Day and Christmas Day (Seasons shown are valid through June 30, 1999.)	No restriction		
DOVE	Sept. 5 – Oct. 10 (12 noon through sunset from Sept. 5 through Sept. 11; thereafter, shooting hours are one-half hour before sunrise to sunset.) Nov. 23 – Nov. 28 Dec. 19 – Jan. 14 (Shooting hours are from one-half hour before sunrise until sunset during Nov. 23–28 & Dec. 19–Jan. 14 seasons.)	12	24	None
RAILS, MOORHENS & GALLINULES				
Moorhens and Gallinules	Sept. 5 – Nov. 13	15	30	None
Clapper Rail, King Rail	Sept. 5 – Nov. 13	15	30	None
Sora Rail, Virginia Rail	Sept. 5 – Nov. 13	25	25	None
CANADA GEESE	Sept. 8 – Sept. 30 (Except N.E. counties)[1] Sept. 1 – Sept. 20 (N.E. counties)[1] (Closed in Currituck and Dare counties)	3	6	None
MIGRATORY WATERFOWL	Federal regulations may be obtained by contacting a license agent or by calling toll free 1-800-675-0263 after Labor Day.			
EXPERIMENTAL TEAL SEASON	Sept. 10 – 19 (east of U.S. 17 only)	4	8	None
DEER		2	6[2]	6[2]
Bow and Arrow	Sept. 7 – Oct. 3 (Eastern)[3] Sept. 7 – Oct. 3 and Oct. 12 – Nov. 21 (Western)[3] Sept. 7 – Nov. 7 (Central)[3] Sept. 7 – Nov. 14 (Northwestern)			
Muzzleloading	Oct. 5 – Oct. 10 (Eastern)[3] Oct. 5 – Oct. 10 (Western) Nov. 9 – Nov. 14 (Central)[3] Nov. 16 – Nov. 21 (Northwestern)			

	Nov. 16 – Nov. 21 (Northwestern) Nov. 16 – Jan. 1 (Central)[2] Nov. 23 – Dec. 12 (Northwestern)[3]			
Gun, Either Sex and Special, Either Sex	See *1998–99 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest*			
BLACK BEAR	See *Regulations Digest*	1	1	1
WILD BOAR	Oct. 12 – Nov. 21 and Dec. 14–Jan. 1	1	1	2
RED & GRAY SQUIRREL	Oct. 12 – Jan. 30	8[4]	16	75
FOX SQUIRREL	Oct. 12 – Dec. 31 (Only in 20 counties; season closed elsewhere; see *Regulations Digest*)	1[4]	2	10
COMMON SNIPE	Nov. 14 – Feb. 28	8	16	None
QUAIL	Nov. 21 – Feb. 27	8	16	None
RUFFED GROUSE	Oct. 12 – Feb. 27	3	6	30
RACCOON & OPOSSUM	Oct. 12 (sunrise) – Jan. 30 (Western season)[5] Oct. 19 (sunrise) – Feb. 27 (Eastern season)[5]	No restriction on opossum See *Regulations Digest* for bag limits on raccoon		
RABBIT Rabbit—Box Trapping	Nov. 21 – Feb. 27 Nov. 21 – Feb. 27	5	10	75
PHEASANT—Non-native Male Pheasant Only	Nov. 21 – Jan. 30	3	6	30
WOODCOCK	Dec. 18 – Jan. 16	3	6	None
BOBCAT	Oct. 12 – Feb. 27[5]	No restriction		
FOX	See *Regulations Digest*			
GROUNDHOG	No closed season or bag limits			
COYOTE	No closed season or bag limits			
NUTRIA	No closed season or bag limits (except Currituck County, see *Regulations Digest*)			
WILD TURKEY Bearded Turkey Only	April 10 – May 8[5]	1	2	2

[1] Counties in N.E. Season are: Bertie, Camden, Chowan, Hyde, Pasquotank, Perquimans, Tyrrell and Washington.
[2] Two of which must be antlerless, see *Regulations Digest.*
[3] See *1998–99 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest* for approximate boundaries of Eastern, Central, Northwestern and Western deer seasons. For a copy of the *Digest*, write: N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27604-1188.
[4] Total limit of 8 squirrels per day of which one can be a fox squirrel.
[5] Season varies by county; see *1998–99 Regulations Digest.*



grasslands

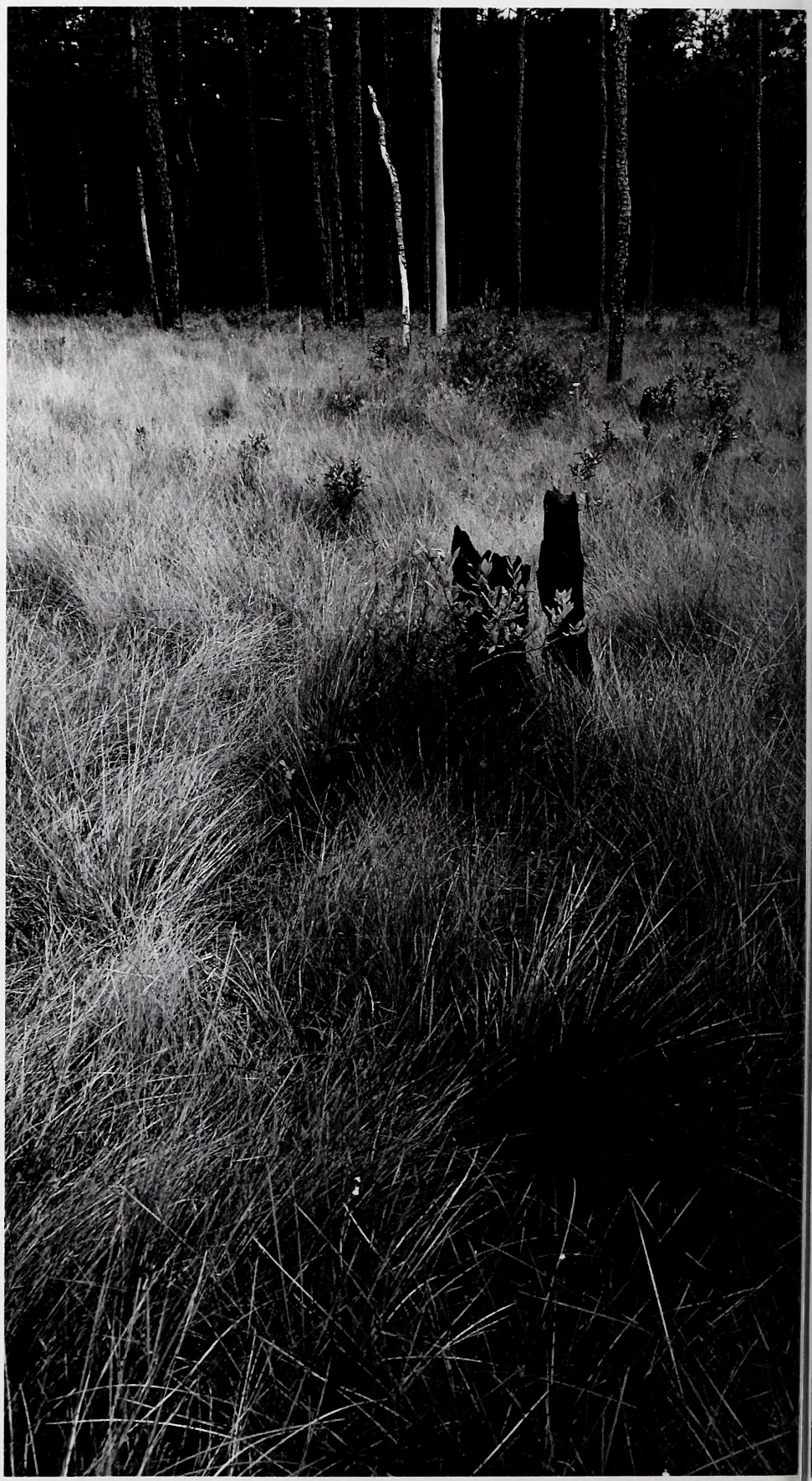
This isn't Kansas and these aren't tallgrass prairies, but spacious grasslands still sway over a surprising swath of North Carolina's landscape.

photographed by
Lawrence S. Earley

mountain bald

The explorers John Lawson and Mark Catesby both left references to extensive grasslands in the North Carolina Piedmont that sound an awful lot like Kansas prairies. Near Salisbury in 1701, Lawson traveled "about 25 miles over pleasant savanna ground, high and dry, having very few trees upon it, and those standing at a great distance apart." Journeying through the Carolina Piedmont in the 1720s, Catesby reported finding "many spacious tracts of meadow-land . . . burdened with grass six feet high."

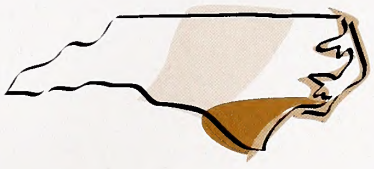
This vast Piedmont prairie ecosystem was probably an artifact of Indian burning habits. It has vanished along with the buffalo and the elk that grazed it, and the grasslands have succeeded to the oak-hickory forests that are characteristic of the region. Yet surprisingly extensive grasslands still play an important role in the natural landscape of North Carolina. From the mountains to the coast, sparsely treed landscapes dominated by grass can be found, providing habitat to wildlife and sustenance to the spirit that loves to wander through these open and treeless domains.



longleaf pine savanna

maritime grassland

Piedmont old field



Piedmont old field
maritime grassland
longleaf pine savanna

salt marsh

"At low tide, the wind blowing across Spartina grass sounds like the wind of the prairie. When the tide is in, the gentle music of moving water is added to the prairie rustle...."

—John and Mildred Teal
Life and Death in the Salt Marsh

They live where it's cold, where it's hot, where it's wet, where it's dry. They feed more people than any other kind of plant. They love sunshine and probably grow right outside your doorstep. What are these wonderful plants?

Glorious Grasses!

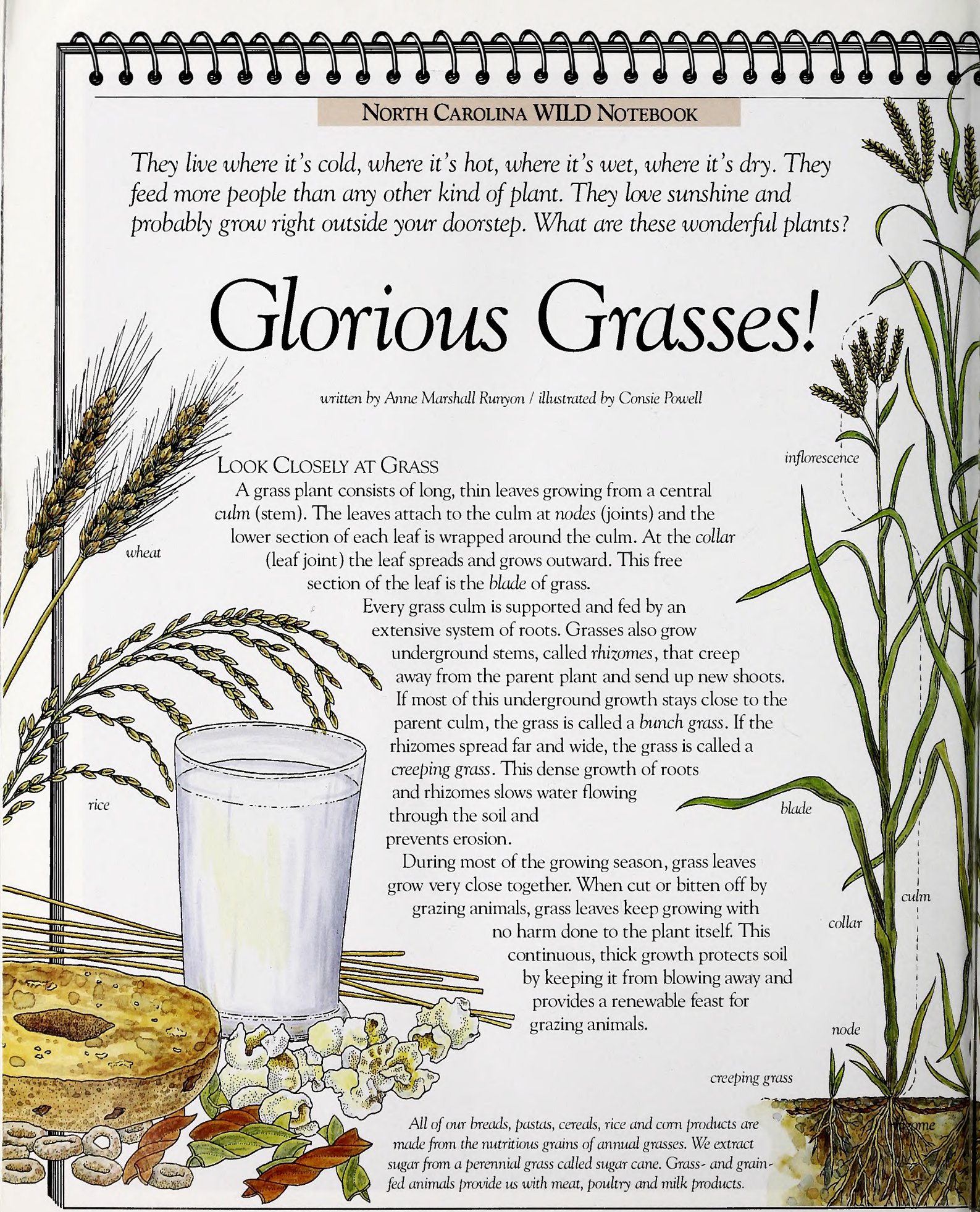
written by Anne Marshall Runyon / illustrated by Consie Powell

LOOK CLOSELY AT GRASS

A grass plant consists of long, thin leaves growing from a central *culm* (stem). The leaves attach to the culm at *nodes* (joints) and the lower section of each leaf is wrapped around the culm. At the *collar* (leaf joint) the leaf spreads and grows outward. This free section of the leaf is the *blade* of grass.

Every grass culm is supported and fed by an extensive system of roots. Grasses also grow underground stems, called *rhizomes*, that creep away from the parent plant and send up new shoots. If most of this underground growth stays close to the parent culm, the grass is called a *bunch grass*. If the rhizomes spread far and wide, the grass is called a *creeping grass*. This dense growth of roots and rhizomes slows water flowing through the soil and prevents erosion.

During most of the growing season, grass leaves grow very close together. When cut or bitten off by grazing animals, grass leaves keep growing with no harm done to the plant itself. This continuous, thick growth protects soil by keeping it from blowing away and provides a renewable feast for grazing animals.

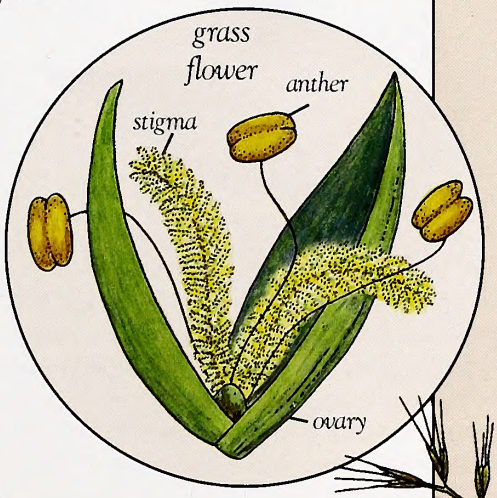


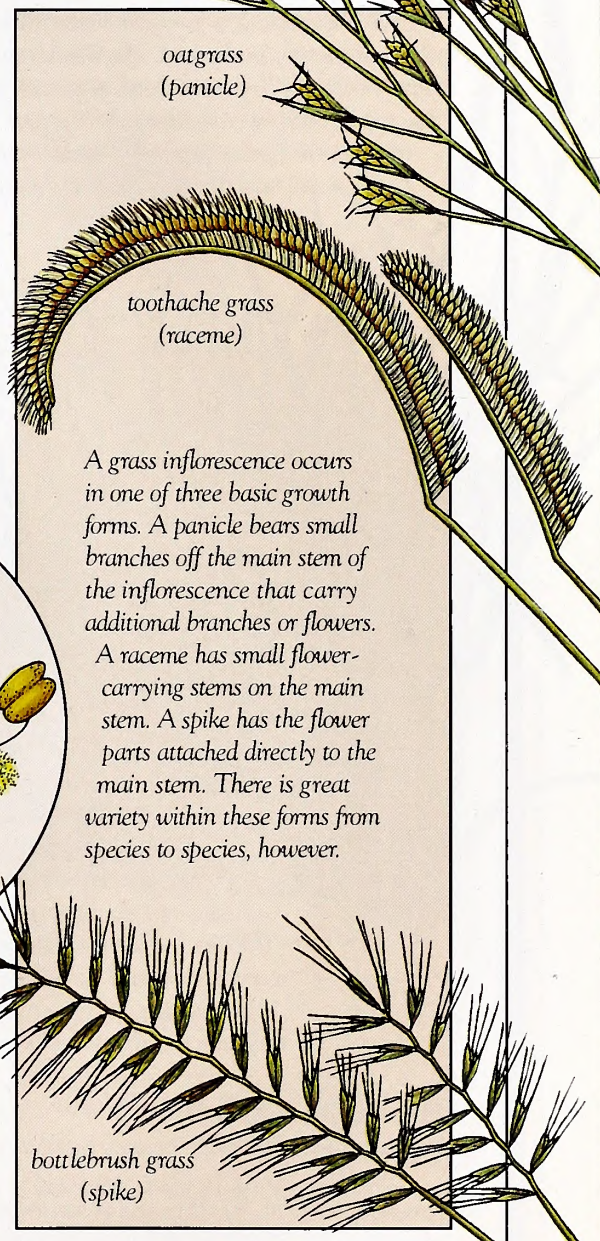
All of our breads, pastas, cereals, rice and corn products are made from the nutritious grains of annual grasses. We extract sugar from a perennial grass called sugar cane. Grass- and grain-fed animals provide us with meat, poultry and milk products.

REPRODUCTION OF GRASSES

When grasses get ready to bloom, the culm lengthens to form an **inflorescence**. Tiny inconspicuous flowers are fertilized by wind-borne pollen and the resulting seeds are what we know as grains.

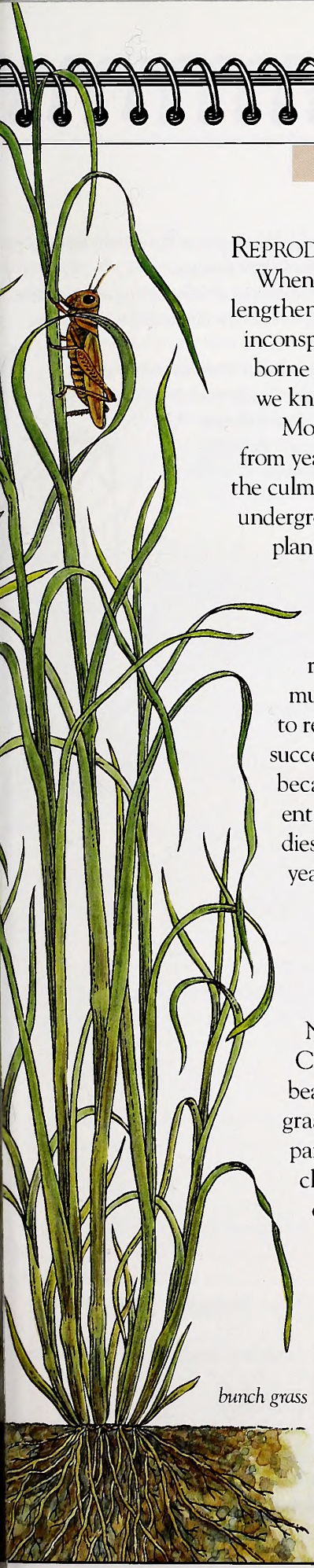
Most grasses are **perennial** and survive from year to year. If cold, drought or fire kills off the culms and leaves, energy stored in protected underground roots and rhizomes enables the plants to regrow when favorable growing conditions return. Because most of their reproduction is from this regrowth, perennial grasses produce relatively little seed. **Annual** grasses must bear many seeds to reproduce successfully, because the entire plant dies each year.





A grass inflorescence occurs in one of three basic growth forms. A panicle bears small branches off the main stem of the inflorescence that carry additional branches or flowers. A raceme has small flower-carrying stems on the main stem. A spike has the flower parts attached directly to the main stem. There is great variety within these forms from species to species, however.

North Carolina's beautiful native grasses are each adapted to a particular habitat. Oatgrass grows in clearings, along roadsides, among rock outcrops and in the grassy balds of the mountains. Many old fields bristle with clumps of broomsedge. Graceful river oats and bottlebrush grass are found in river bottomlands. Coastal plain pine savannas are carpeted with fire-dependent wiregrass and aromatic toothache grass. Far out on the windy barrier islands, sea oats help to hold the sand and build dunes. And along the shores of salty sounds grow the amazing cordgrasses known as *Spartina*.



Some grasses grow best in habitats that are scorched by fire every few years. Such burning kills off larger plants and keeps the land open and sunny.

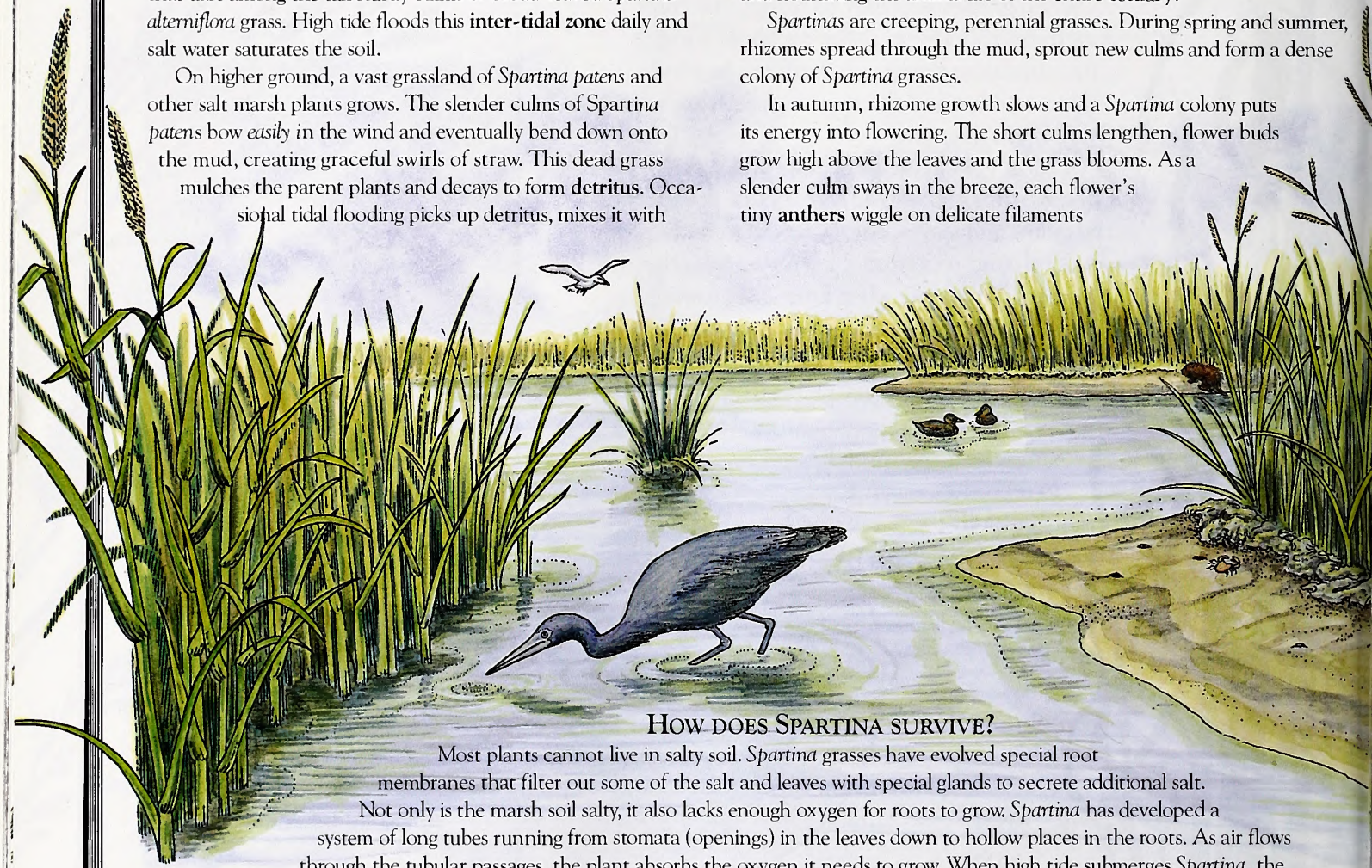
SPARTINA: WONDER OF THE SALT MARSH

Along the edge of a salt marsh, a heron stalks minnows that dart among the tall sturdy culms of broad-leaved *Spartina alterniflora* grass. High tide floods this **inter-tidal zone** daily and salt water saturates the soil.

On higher ground, a vast grassland of *Spartina patens* and other salt marsh plants grows. The slender culms of *Spartina patens* bow easily in the wind and eventually bend down onto the mud, creating graceful swirls of straw. This dead grass mulches the parent plants and decays to form **detritus**. Occasional tidal flooding picks up detritus, mixes it with algae and spreads this delicious "soup" throughout the marsh, feeding and nourishing the animal life of the entire **estuary**.

Spartinas are creeping, perennial grasses. During spring and summer, rhizomes spread through the mud, sprout new culms and form a dense colony of *Spartina* grasses.

In autumn, rhizome growth slows and a *Spartina* colony puts its energy into flowering. The short culms lengthen, flower buds grow high above the leaves and the grass blooms. As a slender culm sways in the breeze, each flower's tiny **anthers** wiggle on delicate filaments



HOW DOES SPARTINA SURVIVE?

Most plants cannot live in salty soil. *Spartina* grasses have evolved special root membranes that filter out some of the salt and leaves with special glands to secrete additional salt.

Not only is the marsh soil salty, it also lacks enough oxygen for roots to grow. *Spartina* has developed a system of long tubes running from stomata (openings) in the leaves down to hollow places in the roots. As air flows through the tubular passages, the plant absorbs the oxygen it needs to grow. When high tide submerges *Spartina*, the stomata close and the air passages stay dry.

During fierce storms, portions of salt marshes on the sound side of barrier islands are sometimes buried with sand that washes across the thin island from the ocean side. Even when buried, *Spartina* quickly grows up through the sandy overwash.

What Does It Mean?

inflorescence: the flower-bearing branch or system of branches on a grass plant
perennial: a plant that lives and grows for more than two years or seasons
annual: a plant that lives and grows for only one year or season
inter-tidal zone: the region of shore that is flooded during high tide and dry during low tide
detritus: a mixture of disintegrated plant fragments and bacteria
estuary: habitat where a creek or river flows into a sound or ocean, mixing fresh and salt waters
anther: plant reproductive organ that makes and releases pollen
stigma: plant reproductive organ that catches pollen
ovary: the part of a plant's reproductive system that contains the ovule (which is fertilized by pollen and grows into a seed)

Read and Find Out

- *Agnes Chase's First Book of Grasses: The Structure of Grasses Explained for Beginners* by Lynn G. Clark and Richard W. Pohl, Smithsonian Institution Press, 1996.
- *Life and Death of the Salt Marsh* by John and Mildred Teal, Ballantine Books, 1969.
- *Planet Earth: Grasslands and Tundra*, Time Life Books, 1985

In *Wildlife in North Carolina*:

- "The Dune Makers" by Lawrence S. Earley, June 1994.
- " The Fiery Story of Wiregrass" by Lawrence S. Earley, July 1994.
- "Miracle in the Marsh" by Lawrence S. Earley, June 1982.

and scatter pollen across the marsh. The two feathery little **stigma** trap the pollen, which fertilizes the **ovary** below. The ovary of each flower develops into a single grain of grass.

Few of these tiny grass seeds grow to become new plants, but many feed hungry black ducks, seaside sparrows and sharptailed sparrows. During fall and winter, snow geese and Canada geese excavate rhizomes and roots with their strong bills, and muskrats dig under mats of dead *Spartina* grasses to nibble the dormant roots and rhizomes beneath the mud.

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Wild Edible Plants: teaches students the relationship between wild plants and contemporary cultivated plants.

Marsh Munchers: teaches students to identify a salt marsh food web.

Fire Ecologies: teaches students to understand positive and negative effects of forest and grassland fires.

Get Outside

Dig up a grass plant after a rain when the soil is soft. Can you find its roots and rhizomes? Is it connected to other grass plants? Is it a creeping grass or a bunch grass?

Visit an old field or pasture, or study an unmowed chemical-free section of a lawn. How many different kinds of grasses can you find? Watch how they grow and when they flower throughout the year.

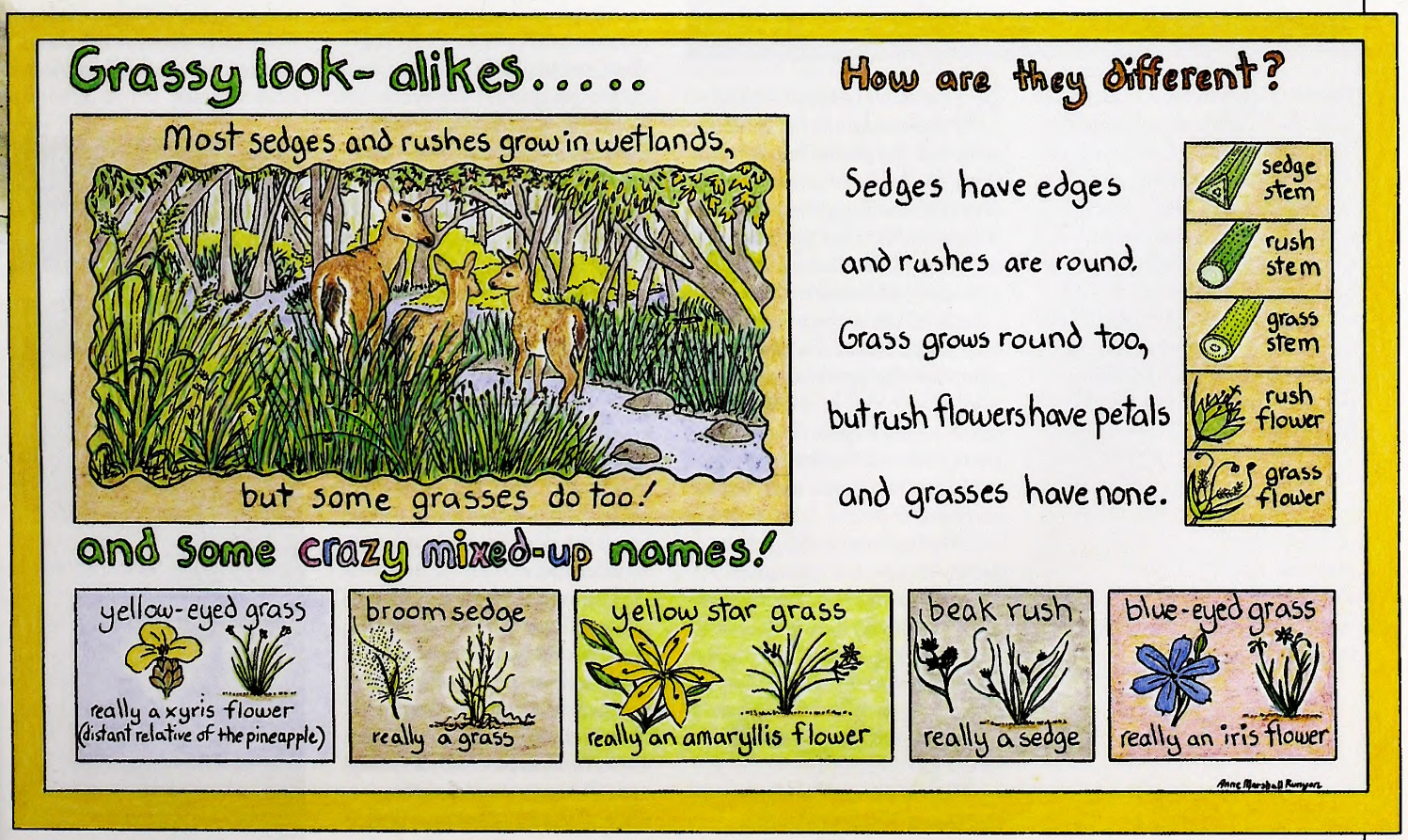
Look for butterflies that use grasses as host plants. The small orange and brown southern skipperling lays her eggs on Bermuda grass, the perfect food for her hungry caterpillars. The large wood nymph uses various grasses as host plants.

Get WILD

The Environmental Educators of North Carolina (EENC) will hold their annual state conference on Sept. 25-27 at Duke University's Nicholas School of the Environment in Durham, N.C. This year's theme is "Environmental Education: A Higher School of Thought." For more information contact Deborah Miller at (919) 541-5552.

N.C. Big Sweep: The annual statewide waterway clean-up will be held this year on Saturday, Sept. 19. For more information contact Judy Bolin at 1-800-27SWEEP or (919) 828-6686.

Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon. Special thanks to manuscript consultant Michael Schafale.



Wildlife Commission Helps Jamaican Teachers Learn N.C. CATCH

KEN TAYLOR

***Patrice Edmond** (above) shows off a fine brook trout she caught during a daylong fishing clinic held at Western Carolina University in June. Beverly Welham Skeen (bottom right), meanwhile, tries her luck in Cullowhee Creek under the instruction of Wildlife Enforcement Officer Vance Gibson. The women were among 92 Jamaican teachers who were taught basic fish identification and fishing skills by the Wildlife Commission.*

Written and Edited by Rodney Foushee

Norma Hill deftly cranked the handle of the spincaster, hefted the plump brook trout from Cullowhee Creek and dropped the flopping fish on the grassy bank on the campus of Western Carolina University.

Nearly 100 teachers and friends let out a cheer in excited unison. It was the first of many fish the Jamaican visitors would catch this bright Saturday morning in June. It was also the 45-year-old social worker's first fish. And that's what really mattered to her.

"My husband and I go fishing in the ocean in Jamaica," Hill explained. "I've been fishing with him for nearly 20 years, and I never caught a fish. I wish he was here to see this." Friends, all smiling, gathered around to have their pictures taken with Norma's trout.

The exuberance shared by Norma Hill and 91 other Jamaican teachers was part of a unique opportunity for the N.C. Wildlife Resources Commission to teach environmental education across international borders. The teachers, through an exchange program with Western Carolina University, take courses at the school during the summer. The chance to teach a fishing clinic to such a varied audience was too valuable to pass up.

"This is important environmental education outreach for the Wildlife Resources Commission and the world," said Zora Rhodes, the Commission education specialist who coordinated the fishing clinic for the Jamaican teachers. Wildlife Commission fisheries technicians stocked the area with fish and provided fishing rods and bait for the teachers.

Rhodes also traveled to Jamaica this past winter to instruct the teachers in N.C. CATCH, the Commission's aquatic education program. "We are a global community and environmental education is important everywhere," she said.

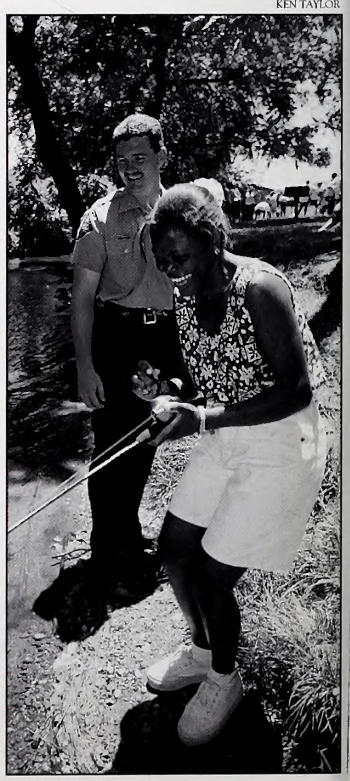
Like the United States, Jamaica has its share of environmental problems. But natural resources are much more scarce in this island nation where rain forests are cleared for timber and streams poisoned by bauxite mining to produce aluminum. Besides instruction, the Wildlife Commission also provided the Jamaican teachers with materials to help them teach science and environmental education.

During the day-long fishing clinic in Cullowhee, the Wildlife Commission's canine enforcement officers treated the teachers to a demonstration of their techniques. Officers Mike Crisco and Vance Gibson along with German shepherd Max showed the teachers how dogs can be used to find game and fish violations and apprehend criminal suspects in the field.

After the canine demonstration, Hill was at it again. Now a seasoned angler, she tried her luck in a nearby pond stocked with channel catfish. Within minutes she was hauling in a 2-pound catfish using her "lucky" rod. The same screams of excitement permeated the air, and then it was time for pictures. Though the trout were grilled up for lunch, the catch-and-release seed had been planted and began blossoming in Norma, who willingly released the catfish back into the pond. Many of the other teachers followed suit.

The memories of the teacher's time in North Carolina and the environmental lessons they learned will be taken back across the Caribbean to be shared with thousands of schoolchildren in Jamaica. The Wildlife Commission plans to continue this educational outreach project next summer.

KEN TAYLOR



N.C. State Zoologists Aid Fish Restoration in Neuse River

Research by North Carolina State University zoologists may help spawn resurgence of two popular but dwindling fish species in the Neuse River.

The striped bass and American shad used to migrate each spring from their home in coastal waters to spawning grounds near the Neuse's headwaters, 267 miles inland. During the last century, the annual migrations were large enough to support commercial fisheries as far inland as Raleigh. But the construction of dams along the Neuse, especially the Quaker Neck Dam near Goldsboro in 1952, restricted the migration and reduced the fishes' access to suitable spawning sites. Their populations have decreased, and harvests all along the river have declined.

Quaker Neck Dam was scheduled to be demolished by this month, opening the door for the re-establishment of 79 miles of prime upstream spawning habitat, all the way to Milburnie Dam near Raleigh.

A study by N.C. State scientists will help fishery biologists identify which sites along the newly accessible stretch are most likely to become important spawning grounds.

"In the past, we knew that a given mile-long stretch of river seemed important to spawning, but we couldn't say which specific spots in that stretch were most important and why. We know this now," said Joseph Hightower, associate professor of zoology at N.C. State and a fishery biologist with the U.S. Geological Survey. "American shad want swift currents and shallow water with rock or gravel substrate," he said. "Striped bass want similar conditions, though they're less particular about the substrate."

Since 1996, Hightower and a graduate student have tracked the migration of American shad and striped bass in the Neuse by tagging them with sonic transmitters. The researchers staked out stretches of the Neuse below Quaker Neck Dam to observe spawning and to mark the exact locations where it happens including the depth of the water, the strength of the current and the condition of the riverbed.

RODNEY FOUSHEE

***Ongoing research by** N.C. State University will help fisheries biologists identify and protect important spawning areas for striped bass (above) and American shad in the Neuse River.*

Armed with these precise measurements and records, conservationists can now identify likely sites above the dam so these sites can be protected from development and monitored for bass and shad activity during the species' first unhindered migration since the dam was built.

"From other studies, there's pretty strong evidence that removing dams pays off handsomely in terms of fisheries health," Hightower said. "We're tentatively projecting a long-term increase of 78,000 American shad due to the new access to additional habitat. The dam removal should greatly enhance recreational fisheries for both species as far inland as Raleigh."

Anglers already began reporting increased populations of both species in the Milburnie Dam vicinity during the spring. "Because of heavy rains, the spring flow was so high this year that some fish were able to pass over the dam and migrate to upstream spawning habitats. That's a very encouraging sign that recreational fisheries in the upper Neuse can be restored, given a chance," Hightower said. Quaker Neck Dam was originally slated to be demolished in late winter, but heavy spring rains forced officials to delay the demolition until early summer.

Hightower and his students will continue to monitor American shad and striped bass migrations in the Neuse over the next few years to better document the benefits of removing a dam.

Among the questions they'll seek to answer: Will all the fish go upstream in future migrations, or will some remain in their more recent spawning habitats below Quaker Neck Dam? Will there be subtle differences between the spawning sites they select upriver and the ones they used downriver? Will access to the more favorable sites upriver improve the species' survival rates, as it has following the removal of dams in other rivers, or has habitat quality in the upper reaches of the Neuse become too degraded?

—Information courtesy of N.C. State University

Chowan Class Documents Striped Bass

Editor's Note: Below is a letter of thanks to Chowan College biology professor Gilbert Tripp and his students for their recent work in documenting striped bass reproduction in the Meherrin River in northeastern North Carolina.

Dear Mr. Tripp,

I am advised of the volunteer work that you and your students undertook this spring to document striped bass spawning in the Meherrin River. The Wildlife Resources Commission has suspected for some time that striped bass were spawning in the Meherrin River but we lacked personnel during the spring months to do the work necessary to confirm our suspicions.

Your diligent work of repeated sampling and sorting through large quantities of detritus has now paid off with the discovery of striped bass eggs in the Meherrin. Although the eggs are few in number, finding these eggs will influence fishery management decisions which we face in protecting aquatic habitats and in developing fishery management plans.

On behalf of the Wildlife Commission, I extend sincere appreciation for the hard work of you and your students in assisting us with this effort.

—Fred A. Harris, chief,
Division of Inland Fisheries
N.C. Wildlife Resources Commission

Bertie County Deer Hunt Benefits Local School System

KEN TAYLOR

***Besides providing hunters with** an excellent chance at a trophy buck, the Bucks for Bertie program has raised more than $140,000 to help improve the educational opportunities for Bertie County schoolchildren.*

Hunters from across the nation have visited a small, rural county in northeastern North Carolina for the past four years eagerly paying for the chance to bring home a prized buck. With one of the highest antlered buck densities in the state, the chances of taking a buck in Bertie County are very good.

But it's not just the thrill of the hunt that rewards hunters participating in the "Bucks for Bertie" program. Each hunter knows that the fees paid will be used to directly enhance the education of Bertie County schoolchildren. For $300, visiting hunters enjoy 2½ days of deer hunting in fields and forest under the direction of local guides. During the hunt, local landowners open up their land, most serving as guides with inside information on the best places to find large bucks. A southern meal is also provided.

The brainchild of an Academics Booster Club member, Bucks for Bertie was designed to raise money for academics in economically depressed Bertie County. Since its inception four years ago, Bertie County Schools has taken in more than $140,000 from the program that has been used to buy new computers, software and other technology for students. The program has also allowed local students to attend vocational competitions and help create a scholarship endowment.

This year's Bucks for Bertie event is set for Nov. 5-7. Space is limited to maintain quality hunting for all participants. For more information and applications, call Bertie County Schools Assistant Superintendent Glenwood Mitchell at (252) 794-3173 Ext. 141.

Woodpecker Habitat Search

The North Carolina Department of Transportation wishes to acquire Coastal Plain and Sandhills properties that are home to active red-cockaded woodpecker clans. If you believe that your land may contain active colonies of the endangered red-cockaded woodpecker and would like to offer your property for sale to the NCDOT, please write or call for a copy of the request for proposal, which will outline the steps for potential purchase by the department. The deadline for submittal is Oct. 9. The contact person for the request is Charles Bruton, with the DOT Planning and Environmental Branch, (919) 733-7844 Ext. 308; P.O. Box 25201 Raleigh, N.C. 27611-5201.

Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

Sept. 12

A program titled Wildlife's Best Friend will be held at the Wildlife Commission's Pisgah Center for Wildlife Education near Brevard. Wildlife enforcement officers along with their canine partners will present this program on the Wildlife Commission's canine unit and the role and function of dogs in wildlife enforcement. Among their many functions, dogs are used to find fish and wildlife violations in the field. For more information, call the center at (828) 877-4423.

Sept. 19

Big Sweep, a cleanup of North Carolina's beaches and waterways, will be held from 9 a.m. to 1 p.m. at various locations across the state. This year marks the 12th anniversary of this highly successful program. To volunteer for a cleanup in your area, call 1-800-27-SWEEP.

Sept. 26

National Hunting and Fishing Day celebrates its 27th anniversary this year. The day honors the contributions of hunters and anglers to the conservation movement. Check your local newspaper or sportsman's clubs for activities and events.

Sept. 26

The third annual North Carolina Wildlife Extravaganza will be held in Burlington. The fund-raising event, sponsored by the N.C. Wildlife Habitat Foundation, will assist in the purchase, management and protection of wildlife habitat in North Carolina. One hundred tickets will be sold at $1,000 each. The event includes a social hour, dinner and raffle. For more information, call (336) 375-4994.

N.C. Zoo Omitted from Article

Dear Wildlife,

I ran across the article on summer vacation spots offering environmental education opportunities for families in the May edition of *Wildlife in North Carolina*. I commend the idea, but have to point out a glaring omission in the article—why was the North Carolina Zoo left out of the story?

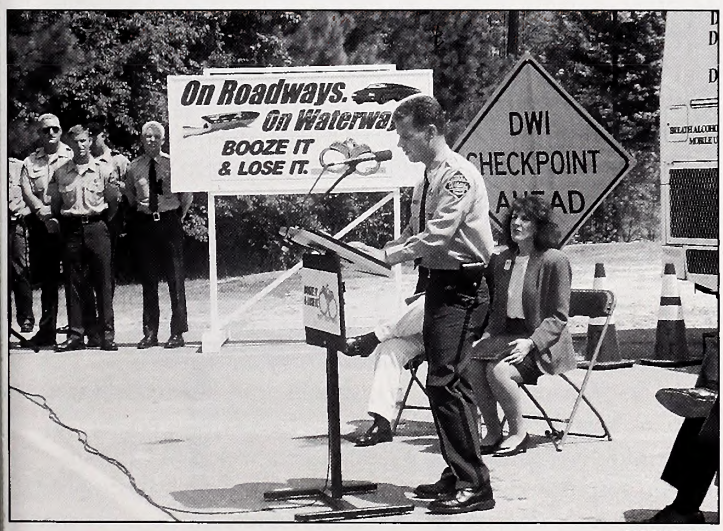
The Zoo is easily one of the largest environmental education centers in the state. We annually have more than 120,000 schoolchildren from across North Carolina who attend the Zoo in class field trips as well as more than 660,000 other visitors. All are presented with a variety of educational programs that convey the important message about conservation of wildlife and all natural resources. The Zoo also has exhibits with 1,100 animals and 60,000 plants that help teacher visitors to better appreciate the natural world while they have fun at the same time.

The Zoo is involved with a number of other state and private agencies in efforts to increase public awareness about the need to conserve North Carolina's natural resources. Among these include a project to preserve green spaces in the rapidly growing Piedmont and support of the red wolf recovery effort. The Zoo also has a streamside exhibit, which focuses on North Carolina water quality issues and features only native plants and animals.

—Rod Hackney,
N.C. Zoological Park
Asheboro, N.C.

Editor's Response: Space limitations meant that we had to omit from our article many facilities offering summer field trips and educational opportunities. One of these, unfortunately, was the North Carolina Zoo.

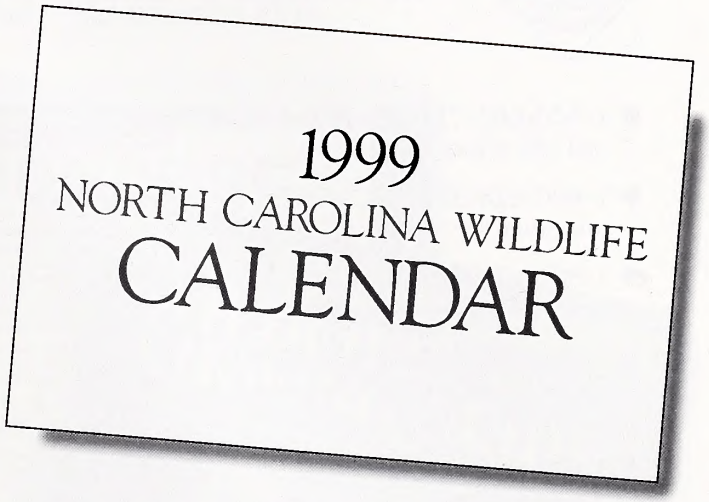
Booze It & Lose It Campaign



BODIE McDOWELL

Wildlife Commission Enforcement *Lt. Mike Bogdanowicz addresses law officers and media representatives in July at Jordan Lake near Raleigh. The Wildlife Commission has joined with other state law enforcement agencies this year in the statewide "Booze It & Loose It" campaign to crack down on the number of people driving cars—and boats—while under the influence of alcohol.*

The 1999 North Carolina Wildlife Calendar Is Here!



With such fine artwork as Mark P. Slawson's "One Fine Day—Cottontail" (featured on the inside back cover), the 1999 North Carolina Wildlife Calendar is sure to sell out. In addition to Slawson, the works of James A. Brooks, Robert B. Dance, Dempsey Essick, Duane Raver, Raney G. Rogers, David Williams, Robert C. Flowers Jr., Brian Edwards and Joe Seme are featured.

Order yours today! Payment must accompany your order. Calendar orders may be charged to VISA or MasterCard, or enclose your check or money order (payable to NCWRC). Complete the form below and mail with payment to:

1999 Calendar, N.C. Wildlife Resources Commission
512 N. Salisbury Street, Raleigh, N.C. 27604-1188
(Office is located at 322 Chapanoke Road in Raleigh.)

GREAT CHRISTMAS GIFT!

Please send me _____ Calendars at $6.00 each . . . . . .$_____

All N.C. residents add $.36 sales tax per calendar . . . . . _____

☐ Enclosed is my check for **total** payment of . . . . . .$_____

☐ Charge to MasterCard or VISA for the calendar(s) ordered above. My card number is _____ and the expiration date is _____/_____.

_____ (____)_____
Card holder signature | Day Time Phone No.

If ordering 7 or more calendars, please provide your UPS deliverable address.

Name _____

Address _____

City/State/Zip_____

Phone (_____) _____

All orders must be prepaid. A $20 charge will be made on returned checks (N.C.G.S. 25-3-512). **For fund raising and bulk rate information (10 calendars or more), call 919-662-4377. Please allow 6 weeks for delivery.**

CAL099

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through June 1998

Principal Balance
$25,305,578.08

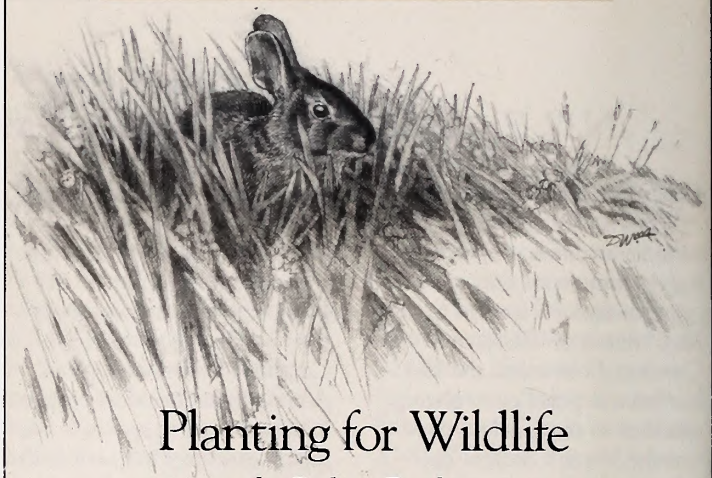
Interest Earned
$26,352,845.48

Total Receipts
$51,658,423.56

Interest Used
$15,250,446.04

Fund Balance
$36,407,977.52

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



Planting for Wildlife

by Rodney Foushee

Planting fall food plots alone is no panacea for producing an abundance of wildlife on your land. But when combined with plenty of good habitat and cover, these crops can help wildlife through the winter and beyond.

Planting Clover: Clover is one of the best wildlife foods that you can plant during September. It serves as good forage for a variety of species including deer, turkeys and rabbits. Clover also attracts plenty of insects so it will provide a good foraging ground for young turkeys and quail next summer.

You can plant perennial ladino clover throughout September in the Coastal Plain and through mid-September in the Piedmont. Since clover doesn't do well in sandy or acidic soils, you need to get a soil test before planting. Adding the proper amounts of lime and fertilizer can make all the difference when it comes to a good clover patch.

Small Grains: Wheat, barley and rye plantings can benefit quail and other birds by providing seeds and insects the following fall and winter. Rye will also provide your deer herd with a nutritious green winter forage. Plantings should be made from now through November. Prepare a seedbed and plant at a rate of 50 pounds per acre. For small food plots, there's no need to trouble with a seed drill. You can simply broadcast the seed by hand or with a small, rotary spreader. As with clover, fertilize and lime according to soil tests.

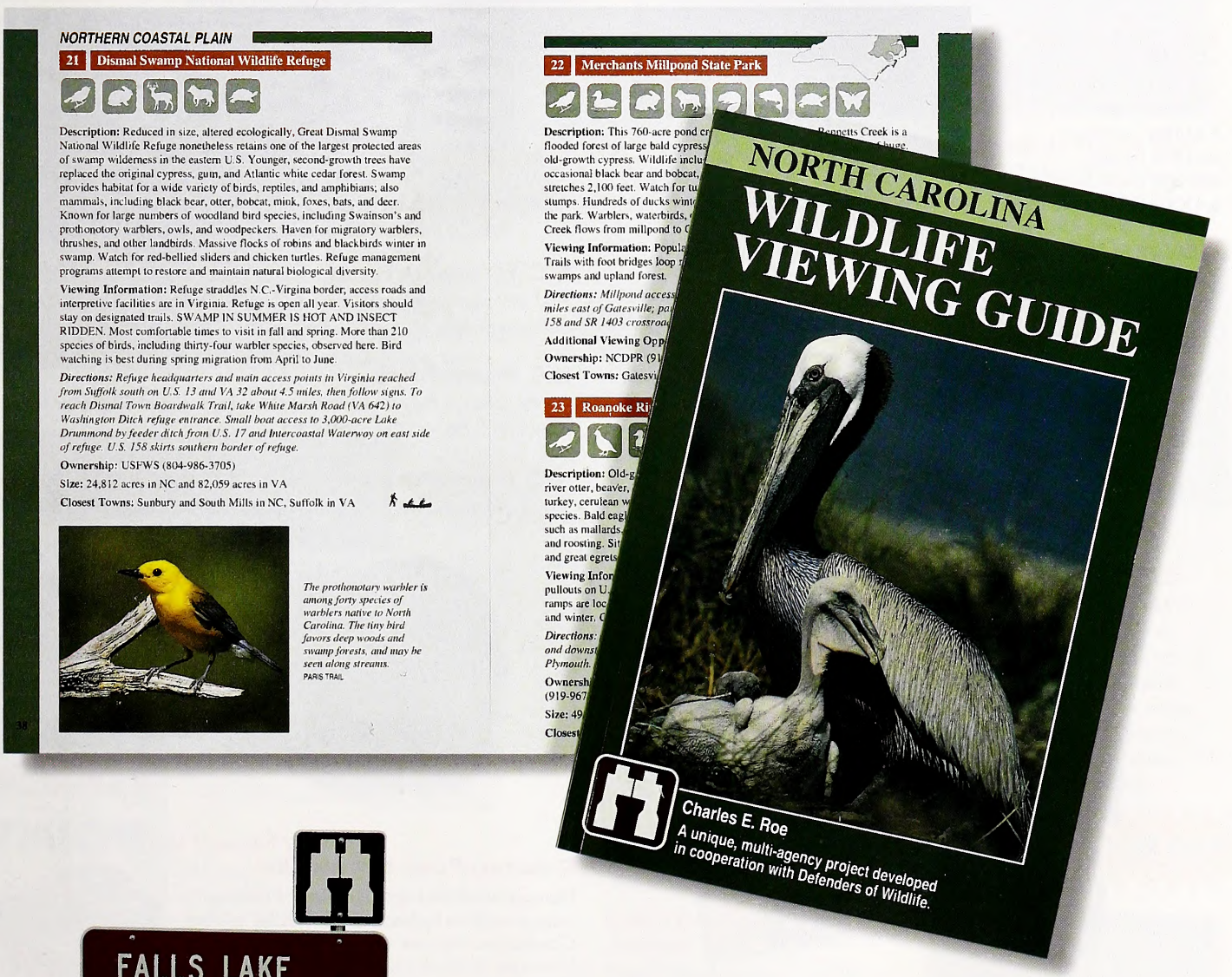
Reclaiming Ponds: If your farm pond is overrun with stunted or undesirable fish species, it may be time to reclaim it by applying the fish poison rotenone before restocking in the fall. September is one of the best months in which to reclaim a pond because the warm water quickly helps break down the rotenone.

To prepare the pond, you should draw down the water to reduce the amount of rotenone needed. Rotenone can be purchased from the Wildlife Commission (a Commission employee must be present when the chemical is applied). After treatment, most fish will die within 24 hours. These fish should be buried immediately. Don't eat poisoned fish or allow livestock to drink from the pond for at least 10 days. Fish may be safely restocked two weeks after treatment. For more information, call the Division of Inland Fisheries at (919) 733-3633.

N.C. WILD STORE

Roam with a View

Wildlife is nearer than you think. The secret is knowing where and when to look.



As you travel across North Carolina, look for these special highways signs that identify wildlife viewing sites.

North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. Each site was selected by a panel of wildlife experts from across the state. Included are detailed descriptions of each viewing site, maps and access information, helpful viewing tips and more than 50 color photos. **$5.95.**

ITEM CODE **N6**

More terrific items

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

White, 100% cotton (preshrunk) T-shirts are guaranteed for comfort and durability. Each shirt features an original design.

N.C. WILD T-SHIRT

N.C. WILD logo printed on front and colorful art on back. **$14.50.**

ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE IN N.C. T-SHIRT

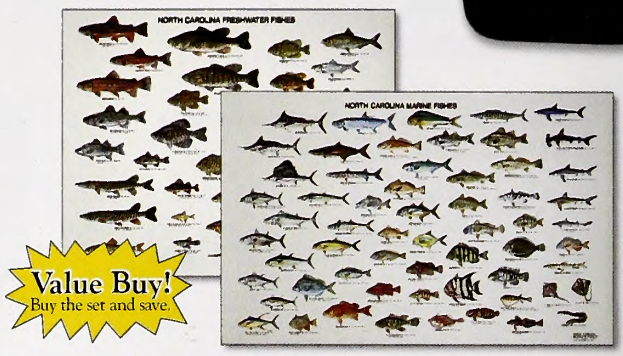
WINC magazine logo on front pocket. Tundra swan art on back. **$14.50.**

ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD CAP

N.C. WILD logo is embroidered on a pro-shape, brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. **$16.50.**

ITEM CODE **A1**



N.C. FRESHWATER FISHES

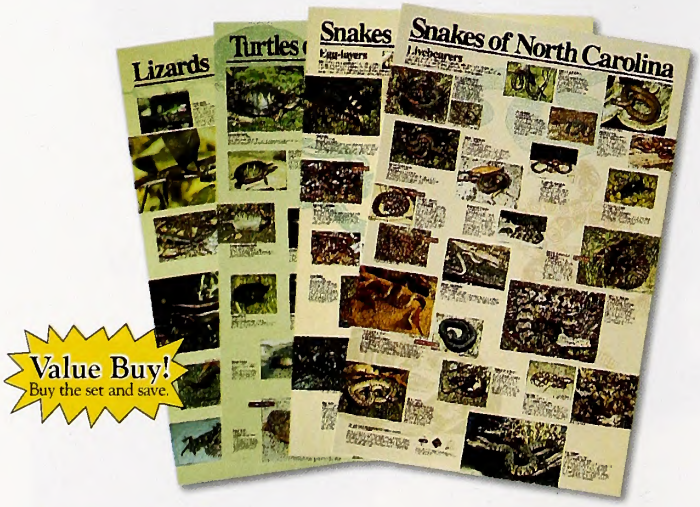
Find your favorite fish with this color poster showing 36 of the state's freshwater fishes. 28" x 22½". **$6.** ITEM CODE **P6**

N.C. MARINE FISHES

All the colors of the sea can be found on this poster of 60 marine fishes. 35" x 22½". **$6.** ITEM CODE **P7**

N.C. FRESHWATER FISHES AND N.C. MARINE FISHES

Save $2 when you buy both posters as a set. **$10.** ITEM CODE **P9**



LIZARDS OF N.C.

Shows all 12 of the state's lizard species. 22" x 34". **$6.** ITEM CODE **P3**

TURTLES OF N.C.

Shows all 21 of the state's turtle species. 22" x 34". **$6.** ITEM CODE **P4**

SNAKES OF N.C. (LIVEBEARERS)

Shows all 17 of the state's livebearing snake species. 22" x 34". **$6.** ITEM CODE **P5**

SNAKES OF N.C. (EGGLAYERS)

Shows all 19 of the state's egg-laying snake species. 22" x 34". **$6.** ITEM CODE **P8**

SET OF 4 POSTERS

You'll save $6 by purchasing the set of four posters above. **$18.**

ITEM CODE **P10**

WILDLIFE IN N.C. CAP

Buck deer silhouette with magazine logo is embroidered on a pro-shape, washed-canvas cotton cap with an adjustable cloth strap and buckle closure. Two-tone cap is navy/stone. **$16.50.**

ITEM CODE **A2**

DOGS THAT POINT, FISH THAT BITE

Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission; hardbound; 220 pages. **$19.95.** ITEM CODE **M8**

WILDLIFE IN N.C. CAP

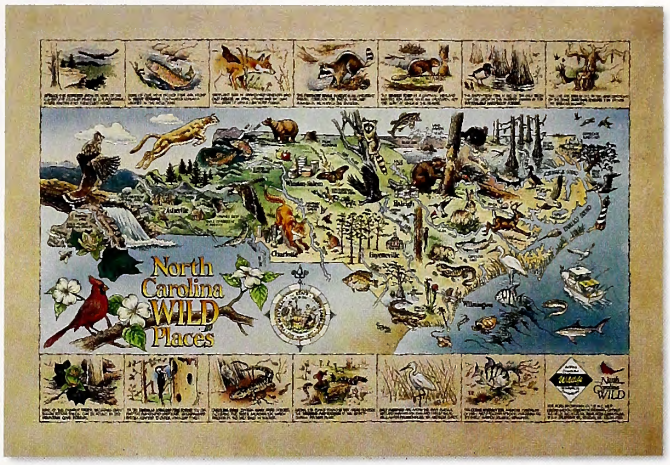
Brook trout and magazine logo are embroidered on a sage-colored, premium weight, pigment-dyed, brushed cotton cap with an unstructured front, an extended bill, and a nubuck suede closure. **$16.50.** ITEM CODE **A3**

Nature's Ways Collection

Since 1978, the illustrated "Nature's Ways" essays in the pages of *Wildlife in North Carolina* have explored wildlife species, ecosystems and the wonders of the natural world. Now more than 200 of these essays are available in paperback. Sold only as a six-volume set. $27.50. ITEM CODE M9

Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.
ITEM CODE M6

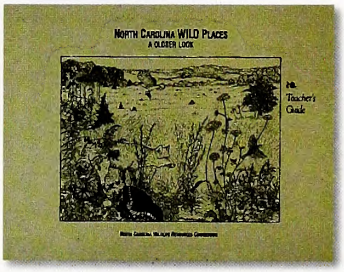


North Carolina WILD Places Map

Artist's Proof. $40. ITEM CODE E2
Limited Edition. $25. ITEM CODE E3
Poster. $6. ITEM CODE E4

North Carolina WILD Places: A Closer Look Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. $6.
ITEM CODE E7



Value Buy!
Buy the set and save.

North Carolina WILD Places Posters

(Set of 3): Posters of "Old Field" and "Mountain Cove Forest" from *North Carolina WILD Places: A Closer Look*. 19½" x 16". Shipped folded with poster version of WILD Places Map. $8. ITEM CODE E5

North Carolina WILD Places: A Closer Look

Easy-to-read text and Anne Marshall Runyon's delightful illustrations make wildlife habitats come alive in this 82-page book. Discusses 13 habitats across the state. $10.
ITEM CODE E1

WILD Places Book and Posters

Buy the *North Carolina WILD Places* book and all three posters and save! (Items E1 and E5) $16. ITEM CODE E6

Wildlife in North Carolina Book

The best of *Wildlife in North Carolina* magazine. Hardbound. $12.
ITEM CODE M3

Magazine Binder

Store 12 issues of the magazine in a sturdy brown leather-look binder with gold lettering. $10.
ITEM CODE M2

North Carolina WILD Journal

Handy calendar notes on wildlife behavior through the year, with room for personal observations. Supplements N.C. WILD Education Sites workshop. $6.
ITEM CODE E8

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
Cub & Boy Scout Correlation. ITEM CODE E9
Girl Scout Correlation. ITEM CODE E10

More terrific items

N.C. WILD STORE

Value Buy! Buy the set and save.

All Things Are Connected

Stirring 12-minute video adaptation of Chief Seattle's speech introduces environmental ethics. $20.
ITEM CODE **W1**

This Land Is Sacred (Teacher's Guide)

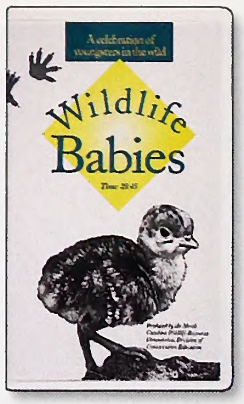
Classroom activities to accompany All Things Are Connected video. $4.50. ITEM CODE **W2**

All Things Are Connected & This Land Is Sacred

Video and Teacher's Guide package. $22. ITEM CODE **W3**

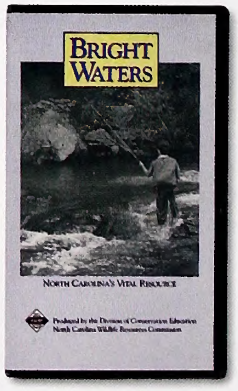
N.C. WILD Notebooks

Each set contains eight issues of *North Carolina WILD Notebook*, the Commission's prize-winning conservation education newsletter. $3 per set.
'95-'96 Set ITEM CODE **E11**
'96-'97 Set ITEM CODE **E12**



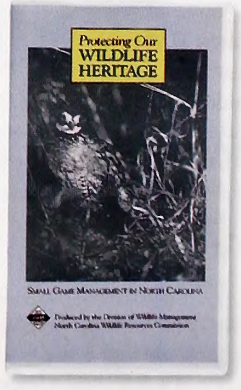
Wildlife Babies

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others. $20. ITEM CODE **N9**



Bright Waters (Video)

30-minute video on fishing and fisheries management in North Carolina's freshwater creeks, rivers and ponds. $20. ITEM CODE **N7**



Protecting Our Wildlife Heritage (Video)

25-minute video offers useful tips for landowners on managing small game. $20. ITEM CODE **N8**

Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. $2. ITEM CODE **M5**

WILDlife Profiles

Each set is designed to fit your standard 3-ring binder and features 10 animal fact sheets. $2 per set.

Set 1. Black bear, raccoon, white-tailed deer, striped skunk, bobwhite quail, wild boar, muskrat, mourning dove, coyote, mallard. ITEM CODE **W4**

Set 2. Mink, canvasback duck, red fox, wild turkey, beaver, American river otter, Canada goose, bobcat, red wolf, cougar. ITEM CODE **W5**

Set 3. Humpback whale, black duck, osprey, clapper rail, red-shouldered hawk, cottonmouth, diamondback terrapin, largemouth bass, black crappie, channel bass. ITEM CODE **W6**

Set 4. Brook trout, garden spider, Tar spiny mussel, wood duck, bullfrog, mayfly, tiger salamander, bog turtle, hellbender, shortnose sturgeon.
ITEM CODE **W7**

Set 5. Cottontail rabbit, gray squirrel, northern flying squirrel, newt, common crow, red-tailed hawk, prothonotary warbler, bluegill, striped bass, Eastern oyster. ITEM CODE **W8**

Set 6. Opossum, peregrine falcon, Eastern bluebird, American toad, rat snake, Eastern glass lizard, smallmouth bass, brown trout, monarch butterfly, Virginia big-eared bat. ITEM CODE **W9**

Set 7. Chipmunk, gray fox, bald eagle, loggerhead shrike, common snapping turtle, five-lined skink, bluefish, rainbow trout, grasshopper, horseshoe crab.
ITEM CODE **W10**

Set 8. Appalachian cottontail, manatee, barred owl, turkey vulture, Neuse River waterdog, spring peeper, coral snake, American alligator, American eel, American shad. ITEM CODE **W11**

Set 9. Southern flying squirrel, fox squirrel, great horned owl, snowy egret, Southern leopard frog, corn snake, Atlantic sturgeon, walleye, luna moth, crayfish. ITEM CODE **W12**

Set 10. Marsh rabbit, woodchuck, hooded warbler, whippoorwill, green salamander, copperhead, fence lizard, muskellunge, chain pickerel, Scotch bonnet. ITEM CODE **W13**

Set 11. Atlantic croaker, Southern flounder, summer flounder, spot, king mackerel, Spanish mackerel, sea mullet, weakfish, spotted seatrout, striped mullet. ITEM CODE **W14**

Set 12. Bay scallop, black sea bass, blue crab, brown shrimp, spiny dogfish and smooth dogfish, gag, hard clam, menhaden, sandbar shark, white perch.
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- ☐ Personalized Lifetime Sportsman (residents only) (age 12 or older) $505.00
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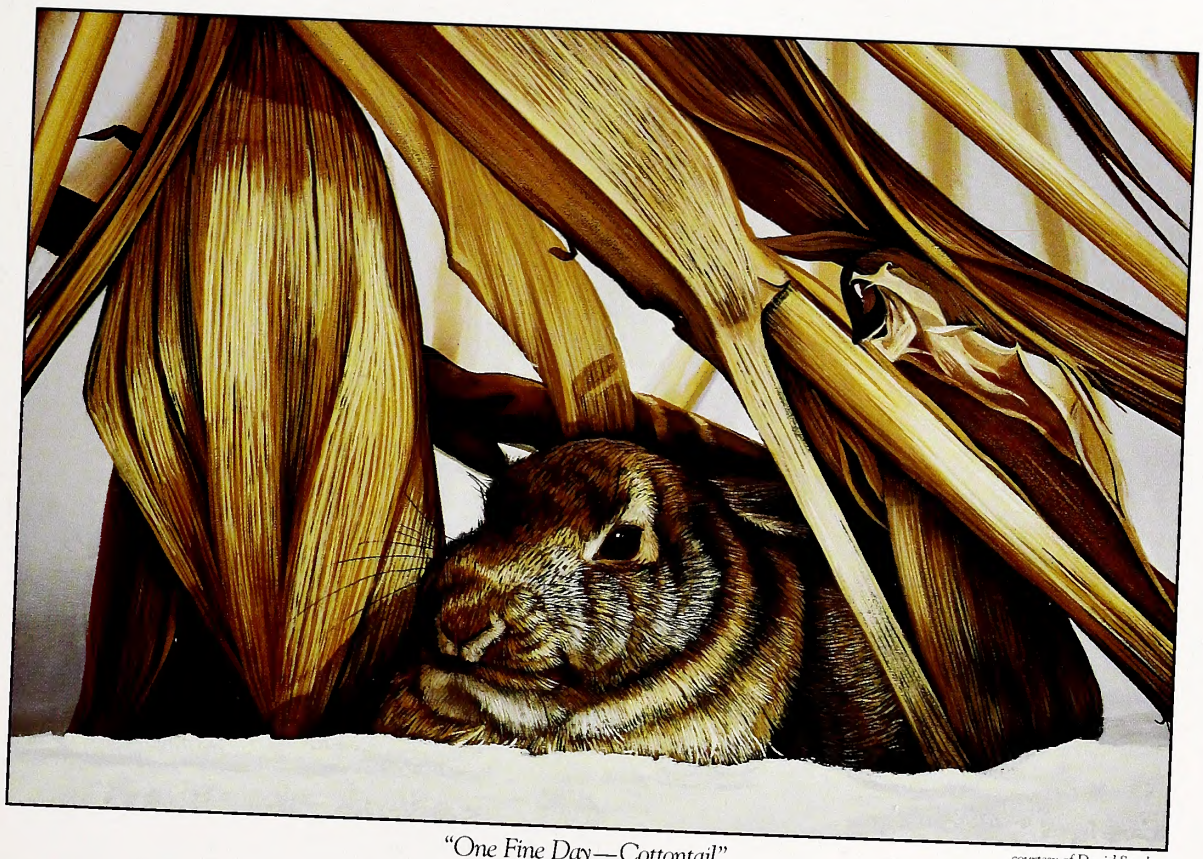

"One Fine Day—Cottontail"
Mark Slawson

courtesy of Daniel Sandore

1999
February

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Fishing Days: Best, Good, Fair, Poor Moon Phases: New, Last Quarter, Full, First Quarter	1 • Spring waterfowl migrations begin	2	3 Purchase waterfowl prints and help preserve waterfowl habitat	4	5	6
7	8 • Black bear cubs born ☾	9	10 • Spring squirrel litters born	11	12 *Lincoln's Birthday*	13
14 *St. Valentine's Day*	15 • Wood ducks look for nests	16 • Spawning peaks for rainbow trout ●	17 *Ash Wednesday*	18	19	20
21	22	23 Don't forget—tax time is your chance to help our state's nongame and	24	25	26	27

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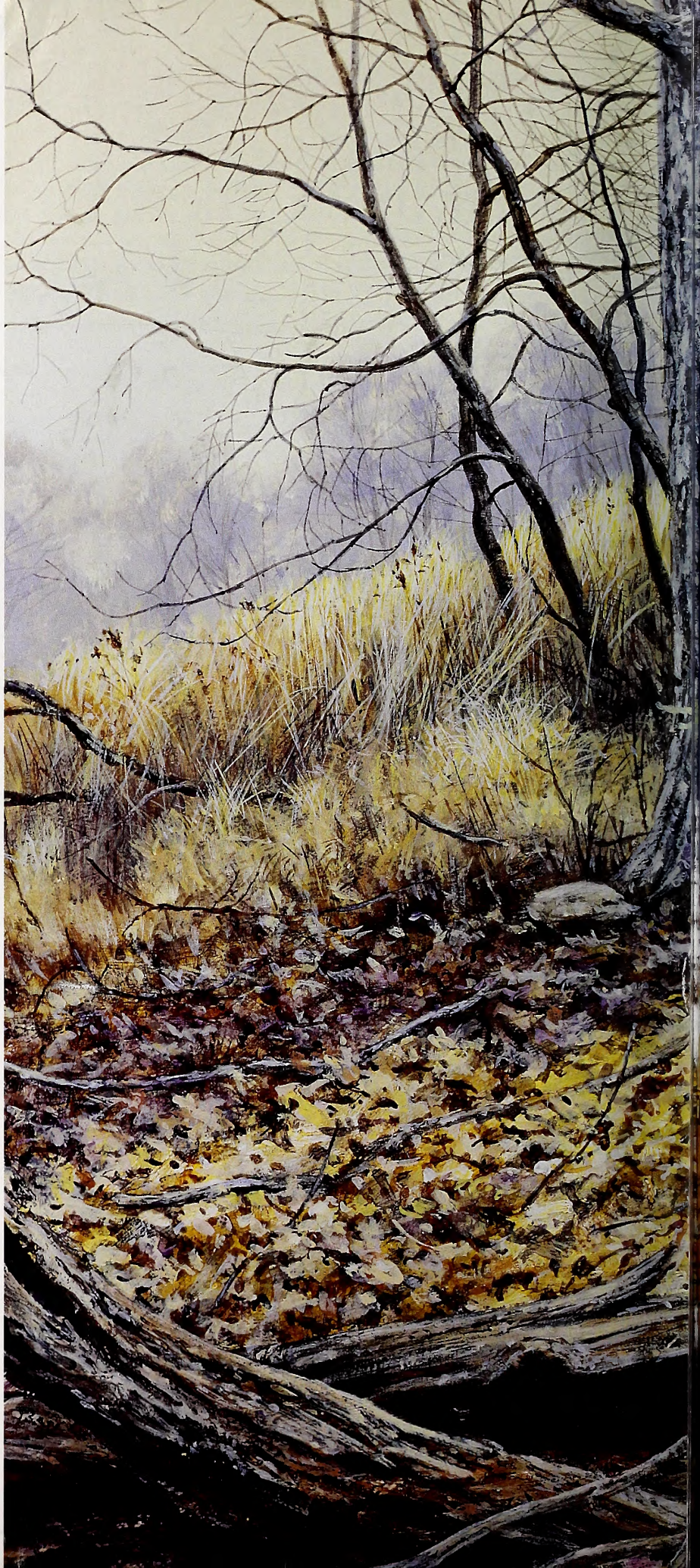

The Once and Future King

This healthy 10-point buck is only part of the story of how North Carolina's deer herd rose from a few thousand at the beginning of the century to today's healthy population of just short of a million.

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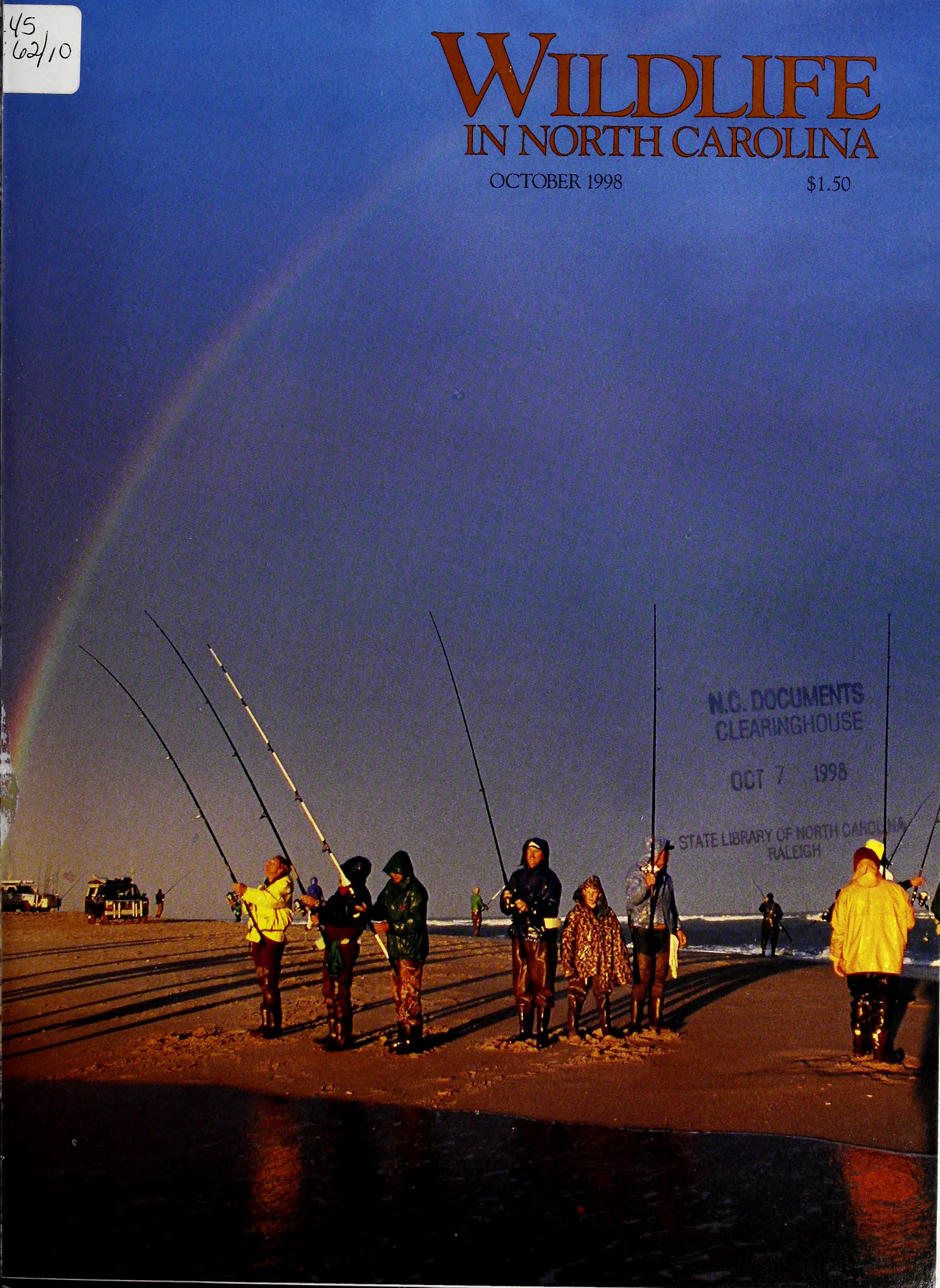

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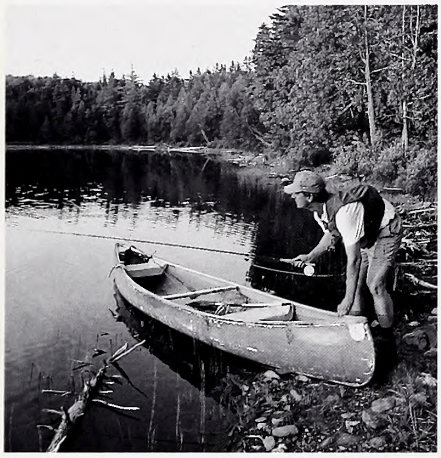
To the North Woods

by Jim Dean ©1998



JIM DEAN

On my first day ever in Maine, Vic Venters and I drove northwest, leaving behind the state's picturesque rocky coast, harbors and seacoast towns with their handsome Victorian and Federal homes, some built by sea captains during the age of sail—all postcard perfect, just as you would imagine. (Vic's name should be familiar since he was assistant editor of *Wildlife in North Carolina* before leaving two years ago to become associate editor of *Shooting Sportsman* in Camden, Maine).

After three hours, the farmland interior increasingly began to acquire the wilderness look of Maine's North Woods, a rolling terrain of low mountains, bogs, countless ponds and lakes, swift rivers and dark forests of spruce, beech and aspen that reminded me of Alaska's interior. Even though it was the weekend of July 4th, traffic was very light.

Instead of the famous North Woods destinations of Rangely or Moosehead Lake—or the more northerly areas along the Allagash River or in Aroostook County—Vic wanted to show me a less famous, but equally impressive, area around Jackman. We'd also get to stay in one of the comfortable new log cabins built by his friends Hal and Debbie Blood who operate Cedar Ridge Outfitters.

"Hal and Debbie host fishermen through the warm months and guide snow mobiling parties and grouse, woodcock, deer, moose and black bear hunters beginning each fall," Vic said. "Being natives and running a lodge, they can give you a better introduction to Maine's back country than I can."

That evening, our guide Mike Stevens drove us 15 miles over primitive logging paths in Hal's growling monster truck, fording beaver ponds that flooded the floorboards despite the huge tires. We hiked the last 10 minutes to a pond two miles from the Canadian border. "This pond is named Mary Petuche for a lady who, shall we say, charmed loggers who first cut timber here years ago," Mike explained.

Mere hours out of Raleigh, I was soon casting for native brook trout in the midst of wilderness vast and quiet beyond what most of us can imagine. Except for the swish of fly lines, the only sounds were the whine of mosquitoes—we had slathered ourselves in bug dope for them—and the songs of loons. The black fly season was past, therefore the so-called "State Bird of Maine" was happily absent.

Recent rains had cooled the water and dampened the hatches of mayflies and caddis, but we had good luck with smaller brookies. Yet, appropriately, it was a traditional wet fly of this region, the gaudy Parmachene Belle, that attracted the most trout. Over the next few days, Mike took us to half a dozen other wild brookie ponds, admitting that he had 18 canoes stashed on various ponds, especially those likely to yield wild fish measured in pounds rather than inches.

One surprise was his revelation that the moose population had exploded in recent years. "Moose hunting is good here and, with only 1,500 permits issued by lottery each year, it's likely to stay good," Mike said. "Sadly, road kills are common, and over 80 were killed on the stretch of highway up to Jackman this past year."

Three days later, we headed back east to the upper Penobscot above Bangor to sample what is undoubtedly one of the best smallmouth bass rivers in the world. Guided by *Fly Rod & Reel* editor Jim Butler and his father Phil, we canoed and fly-fished a stretch where catches of 30 to 50 feisty smallmouths a day in the 1- to 3-pound class—some bigger—are common. We landed no trophies, but had fast action on bugs and sinking flies. We saw no other fishermen, but Jim explained that many natives consider the smallmouth little more than algae with fins.

"A week in Maine is hardly enough time to get more than a taste, but my impression is that this remains very much a land of great sporting opportunity and contrast."

A week in Maine is hardly enough time to get more than a taste, but my impression is that this remains very much a land of great sporting opportunity and contrast. Its vast and intact northern wilderness and stretches of untamed rocky coast lie within easy reach of handsome coastal towns and boat-filled harbors where civilized tastes can be indulged in countless fine restaurants, bed-and-breakfasts and antique shops. It would be no great chore to go sailing, shopping and dining on the same day you photograph a moose, catch wild brookies, shoot a brace of grouse and woodcock or land a 20-pound striped bass from a rock-strewn beach.

Oh yes, add a traditional Down East lobster feast to that list. Like moose and stripers, the lobster population is booming. Ironically, many believe the depletion of the northeast fisheries of cod, haddock and other commercial finfish has removed the lobster's main predators.

One more thing. You should know that the State Bird is generally gone by early July.

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Overwhelmed
by the holiday rush?

KEN TAYLOR

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CONTENTS

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October 1998 *Volume 62, Number 10*

FEATURES

4 **Cape Lookout Adventure**
written and photographed by F. Eugene Hester ©1998
illustrated by Chris Armstrong ©1998
It was a week of surf-fishing on the deserted beaches of Cape Lookout National Seashore. It was a week to remember.

10 **Lost in Angola Bay** *written by Rodney Foushee*
Beyond the rampart of pond pine, cane and briers lay B. W. Wells' great evergreen shrub bog. It looked formidable. It looked impossible.

14 **The Season of Color**
Summer passes to fall and nature gradually ignites in a spectacular show of intense color. It's a world made for the photographer. Which is why we asked a handful of our favorite photographers to interpret autumn, in words and pictures. We think you'll like what they have to offer.

20 **Dancing with the Widowmaker**
written and photographed by Burt Kornegay ©1998
Things that go bump in the night can also kill the unwary backpacker. You don't have to be paranoid to be aware of what experienced outdoorsmen call widowmakers.

24 **Mix Your Deer-Hunting Strategies**
written and photographed by Gerald Almy ©1998
Weary of the same old, same old? Varying your hunting techniques during the day can restore your hunting pleasure and may even put that wall-hanger within reach.

page 14

page 24

page 10

DEPARTMENTS

page 28

Our Natural Heritage *by Jim Dean* ©1998 ..... **inside cover**
Nature's Ways *by Jeff Beane* ©1998 2
N.C. WILD Notebook *by Buffy Silverman* ©1998 28
Back Porch *by Rodney Foushee* 32
Wildlife Through the Year *by Rodney Foushee* 36

Cover *Surf fishermen crowd the beaches at Cape Hatteras in autumn. Photograph by Scott Taylor.* ©1998

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Poisonous or Venomous?

written by Jeff Beane ©1998
illustrated by David Williams

People often confuse the terms "poisonous" and "venomous." Most dictionaries include "poison" as a synonym of or as part of the definition of "venom." While biologists may also use the terms interchangeably, most define venom as a substance that causes harm if introduced into the bloodstream, and poison as a substance causing harm if ingested (or, in some cases, applied externally). Creatures that inject harmful substances, such as snakes, wasps, spiders, scorpions, centipedes and jellyfishes, are referred to as venomous. Those that merely secrete harmful substances, or harbor them in their tissues, such as newts, toads, millipedes, mushrooms and plants, are termed poisonous. (Whoever heard of "venom oak" or "venom ivy?") One might say that venoms are specialized poisons, but not all poisons are venoms.

The word "toxin" adds further confusion, and in its broadest sense may refer to any harmful substance. *Biotoxins* are toxins produced by living things. Plants produce *phytotoxins* and animals produce *zootoxins*. Whatever we call them, offensive and defensive chemical weapons are vital to the survival of many living things.

Venoms are usually used for subduing prey. Some animals, like crowned and pine woods snakes, use their venom only for that purpose. Others, like bees, use venom solely for defense. Most venomous animals probably use their venom primarily for obtaining food and secondarily for defense.

Most poisons are used exclusively for defense against predators. Most creatures make their own poisons, but some steal them from other sources. A monarch butterfly tastes bad because it stores in its tissues the toxins from the milkweed upon which it fed as a caterpillar.

Some organisms may accidentally become poisonous. Box turtles can eat death angel mushrooms with impunity, but the toxins remain in their tissues. Humans have died from eating such "spiked" box turtles. Some marine fishes may be poisonous or not depending on the seasonal or regional abundance of toxic plankton.

Other creatures are only partially poisonous. Some puffer fishes have delicious flesh, but their internal organs contain deadly tetrodotoxins. The young shoots of pokeweed make tasty greens, but mature leaves and stems contain lethal poisons.

Venoms and poisons come in myriad forms, from the alkaloids contained in many plants, to the formic acid of ants and wasps, to the hydrogen cyanide secreted by some millipedes, to the proteolytic enzymes of snakes and spiders, to the impressively complex neurotoxins of scorpions. Many biotoxins have been poorly studied and contain components that are largely unknown.

Nearly as diverse are the often ingenious methods of venom delivery. Snakes inject theirs through specialized hollow or grooved teeth. Spiders, octopi and bloodworms use modified jaw parts. Scorpions use their unique tail tips. Ants, bees and wasps employ modified ovipositors (some ants both bite and sting). Stingrays rely on special spines in their tails. Catfishes use modified dorsal and pectoral fin rays. Corals and jellyfishes sting with special intracellular structures called *nematocysts*. Centipedes appear to "bite," but actually deliver venom via a modified leg or "poison claw." Some caterpillars, and at least one species of starfish, have stinging spines virtually covering their bodies.

The effectiveness of a venom or poison depends largely upon its concentration—all substances are toxic in sufficient quantity. We breathe oxygen, but pure oxygen would kill us. We require vitamin A, but a polar bear liver contains enough of it to make a deadly pâté.

The same poisons affect different species, and even different individuals within a species, differently. Kingsnakes and opossums are highly resistant to snake venoms. To some humans a bee sting can be fatal; to others it is of little consequence. Some people are unaffected by poison ivy, while others react severely to it.

Venoms and poisons are intricately woven throughout Nature's fabric. As organisms constantly evolve better and stronger toxins, their predators and prey continually develop strategies for avoiding or counteracting them. The result is an ongoing game, where many use chemicals to gain an advantage, but no one holds the upper hand for long.

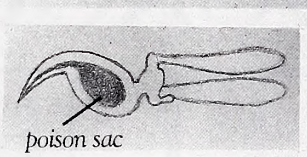
Jeff Beane is a curator of herpetology at the N.C. Museum of Natural Sciences.

Other Reading

- Whit Gibbons, Robert R. Haynes, and Joab L. Thomas, *Poisonous Plants and Venomous Animals of Alabama and Adjoining States* (University of Alabama Press, 1990).
- Bruce W. Halstead, *Poisonous and Venomous Marine Animals of the World* (three volumes) (United States Government Printing Office, 1965).
- John Nichol, *Bites and Stings: The World of Venomous Animals* (Facts on File, 1989).

Surfing the Web

- Visit this web site for quality information on scorpions and their venoms. *Address:* http://wrbu.si.edu/www/stockwell/faq/sting.html
- Much useful information on poisonous plants may be found at The Cornell University Poisonous Plants Web Site. *Address:* http://www.ansci.cornell.edu/plants.html
- This web site contains good information on prevention and treatment of snakebite as well as venomous arthropod bites and stings. *Address:* http://io.datasys.swri.edu/wisdom/Panel_11_Snake_bite.html
- This site covers first aid treatment for bites and stings of many venomous Australian animals, with universal applications. *Address:* http://www.parasolemt.com.au/afa/afa31.html



Scorpions are venomous, *not poisonous. Their specialized tail tips contain two glandular sacs that produce and store venom, injected via a sharp, hollow spine. North Carolina's only native scorpion,* Vaejovis carolinianus, *is a small species found primarily in the southern Mountains. Its sting is not dangerous to humans.*

scorpion

cricket

Venomous creatures, such as *jellyfishes, spiders, yellow jackets, centipedes and rattlesnakes, inject harmful substances. Venoms may be used for subduing prey, for defense, or both.*

poison oak

poison ivy

jellyfish

black widow

yellow jacket

spotted salamander

southern toad

timber rattler

Poisonous creatures, such as *poison oak, poison ivy, mushrooms, millipedes and toads, secrete noxious substances or harbor them in their tissues. Most poisons are used solely for defense.*

Cape Lookout ADVENTURE

It was a week of surf-fishing on the deserted beaches
of Cape Lookout National Seashore.
It was a week to remember.

written and photographed by F. Eugene Hester ©1998
illustrated by Chris Armstrong ©1998

As we moved across Core Sound aboard the little ferry Capt. Alger, we could see large flocks of birds flying in long lines silhouetted against the early-morning November sky. Were they heading where we were going? Was Cape Lookout on their itineraries?

We had just departed the small Carteret County town of Davis, headed for a week-long surf-fishing adventure on South Core Banks, which is part of the Cape Lookout National Seashore. Henry Poole, of Knightdale, and I were joining a dozen veteran Salisbury fishermen for whom this autumn pilgrimage is an annual adventure. For more than three decades they have fished at Hatteras, Nags Head, Ocracoke and Portsmouth islands as well as Cape Lookout, and their stories of schools of aggressive bluefish and of false albacore breaking fishing lines had long whetted our appetites. But I didn't suspect when I set foot in the boat that morning that our week on Cape Lookout with them would be one of the greatest fishing adventures of my life.

Henry and I spent the night before in Morehead City and then drove to Davis, where we were to catch the first ferry to the island. As the sun rose across Core Sound, we were at the boat dock, busily moving our fully loaded vehicles onto the boat. The ferry and the rustic cabins we would soon occupy on the island were operated by the Alger G. Willis Fishing Camps Inc. This ferry has room for only four vehicles, and fully loaded Suburbans and Tahoes, with gear attached front and back, take up a lot of space. The expert way the two-man crew directed vehicles on and off the ferry showed that they had done this many times. They smoothly guided vehicles to within inches of one another. This would be the first of five round trips to the island today.

Soon we were unloading our vehicles on the island dock and eagerly peppering departing anglers with questions about their success. Their stories and advice added to our anticipation.

I was glad we had filled the gas tanks on our vehicles before leaving the mainland. It

A proud Hayden Simmerson *holds up a nice bluefish on the beach at Cape Lookout. Aggressive bluefish that regularly slice into schools of baitfish in the surf can provide exciting moments and great fishing for anglers.*

The cameraderie that *develops among surf fishermen no doubt produces a fish tale or two, especially over a cup of hot coffee (top). Don Sayers unhooks a good-sized flounder from his rig (above) while other anglers prove that the beach can be a popular place on Cape Lookout National Seashore in autumn (right).*

was apparent that this long, narrow island of sand is a land shaped by wind and waves, with few human touches—no roads, no electricity, no telephones. The most visible man-made structure is the Cape Lookout Lighthouse, standing tall above the dunes and shrubs. Other structures among the dunes were the rental cabins, where we unloaded our sleeping bags and other gear. The cabins had mattresses, gas stoves, drinking water, sinks, commodes, hot water and showers. Our ice chests served as refrigerators. The cabins were simple but adequate.

The group began to plot fishing strategies after setting up camp. We decided that our fishing locations each day would be determined by what we knew of wind, waves and tides, but we wanted to remain flexible. Successful fishermen often share details of productive places. And as we traveled the beach we planned to watch for good locations, especially steep drop-offs with deep water near shore, or sloughs in the surf. This information would be helpful in planning activities for the next day.

Our first day was spent mostly exploring the 26-mile island. We traveled in four-wheel-drive vehicles, driving in the sand just above the tide line. Each vehicle was equipped with ice chests, rods in rod holders, tackle boxes, bait buckets and cooking gear for some meals on the beach. Perhaps equally important was the two-way radio in each of the three vehicles. The radios kept us in touch so we could compare success when we fished a few miles apart. In the broad inlet at the north end, toward Portsmouth Island, we bottom-fished with cut mullet and shrimp but had little

success. We moved down the beach, stopping at intervals to fish at likely locations.

The birds were often our guides. As predatory fish such as bluefish chased baitfish below the surface, the fleeing and injured minnows swam near the surface, where swarms of terns, gulls and even pelicans dove on them from above. Over many years, my companions have come to recognize that large numbers of birds and frantic diving and feeding activity promise actively feeding fish and fast fishing action. We caught an assortment of bluefish, small black drum, blowfish, skates and a small shark, but even so, we were somewhat disappointed because there was nothing special about the number or sizes of the fish that first day.

Chalk up our first day to learning.

The next morning we traveled several miles down the beach to the jetties at the southwest end of the island. This long row of large boulders had been especially productive to Ralph Wear, who had had good success with sea trout on previous trips.

As we approached, we faced a strong wind with large waves breaking against the boulders. In the rough water just in front of the rocks, it soon became apparent that Ralph's suggestion was a good one. We caught speckled trout using live minnows. Some lures, especially green plastic grubs with red lead heads, also worked well. To solve the problem of hanging up on the rocks, we used minnows without weights with good success.

On the backside of the jetties the water was calmer, with a smooth sand bottom in waist-deep water. Dick and Kent Goodman used minnows there, too, and caught some nice flounder.

"Good news!" Webster Collett told us that night. His group had had good fishing on the peninsula at the extreme southern end of the island. The peninsula juts out into the ocean, with deep water on three sides, and at high tide much of it is under water. In the fall, crowds of anglers jostle for position there. Despite the likelihood of angler competition, we made plans to be there before high tide the next morning.

Within minutes of our arrival the next day, we started catching small channel bass (puppy drum). Henry Poole caught two on the two hooks of his bottom-fishing rig. Most were just short of the legal minimum size of 18 inches, but for catch-and-release fishing, this was no problem. We caught most of them while bottom-fishing with shrimp, but Ran Turner showed us that cut mullet was equally effective. Some were also caught on lures, especially Hopkins spoons. We also caught several bluefish and flounder.

When the action slowed at one point, Ralph warned me to watch for false albacore. He had caught several false albacore there on previous trips, and he saw what they could do. "They'll swim through the surf at about the speed of a bullet, and your tackle may not be strong enough to hold them. On our last trip, I couldn't get them to take a Hopkins spoon, but I caught three on red-and-white MirrOlures," he said.

Ralph's most exciting catch of false albacore was taken on a fly rod with a 20-pound leader. "I was using a big lead-head feather jig. A 12-pound fish grabbed the lure and never slowed down until he had stripped my line, plus 200 yards of backing. It was a long battle, but I finally got the fish in," he told me.

"Don't expect to hold a false albacore with less than 20-pound line," Ralph cautioned. "Even then you'll be lucky to land the fish."

The peninsula was a great place to fish. Its deep water and strong current seemed to attract the fish. After the first successful trip there, we fished at the peninsula for at least a few hours each day.

On Thursday, as we drove along the beach toward the peninsula, Ralph Wear suddenly called out, "Birds! About 300 yards ahead and right in the surf!"

We all saw Ralph's birds at once and realized our action was about to start. As soon as Dr. Tommy Thompson stopped the car and pulled alongside the birds, we all jumped out. Everybody grabbed a rod and baited up with shrimp, cut mullet and artificial lures.

It was a school of nice bluefish, certainly not of record size, but adequate for a fish fry. The important thing was that the fish were close in, and they were active. Bluefish move fast and devour about anything they can catch. True to that reputation, these fish were hungry and aggressive; they hit everything we threw at them.

I used a metal Hopkins spoon, my favorite when the fishing is hot and heavy. The action of the lure is fast and effective. Because of its weight and shape, it's easy to cast long distances right into the breakers, and often right into the feeding school of fish. It also is a fast lure to retrieve, making it possible to cast more times to a passing school of fish.

Though this lure can be cast a long way, I will admit that regardless of what tackle or technique I use, I frequently wish I could cast it twice as far. Often the fish seem to be just out of range.

At this time and place, though, everything was right. The fish were in close, the casts were far enough, and I got a strike on nearly every cast. The action was great until the fish and their accompanying birds moved up the beach and farther from shore. We watched, as the flock of birds continued to feed, too far out for us to reach the fish under them.

"It was apparent that this long, narrow island of sand is a land shaped by wind and waves, with few human touches."

Goin' to Cape Lookout?

Preparations

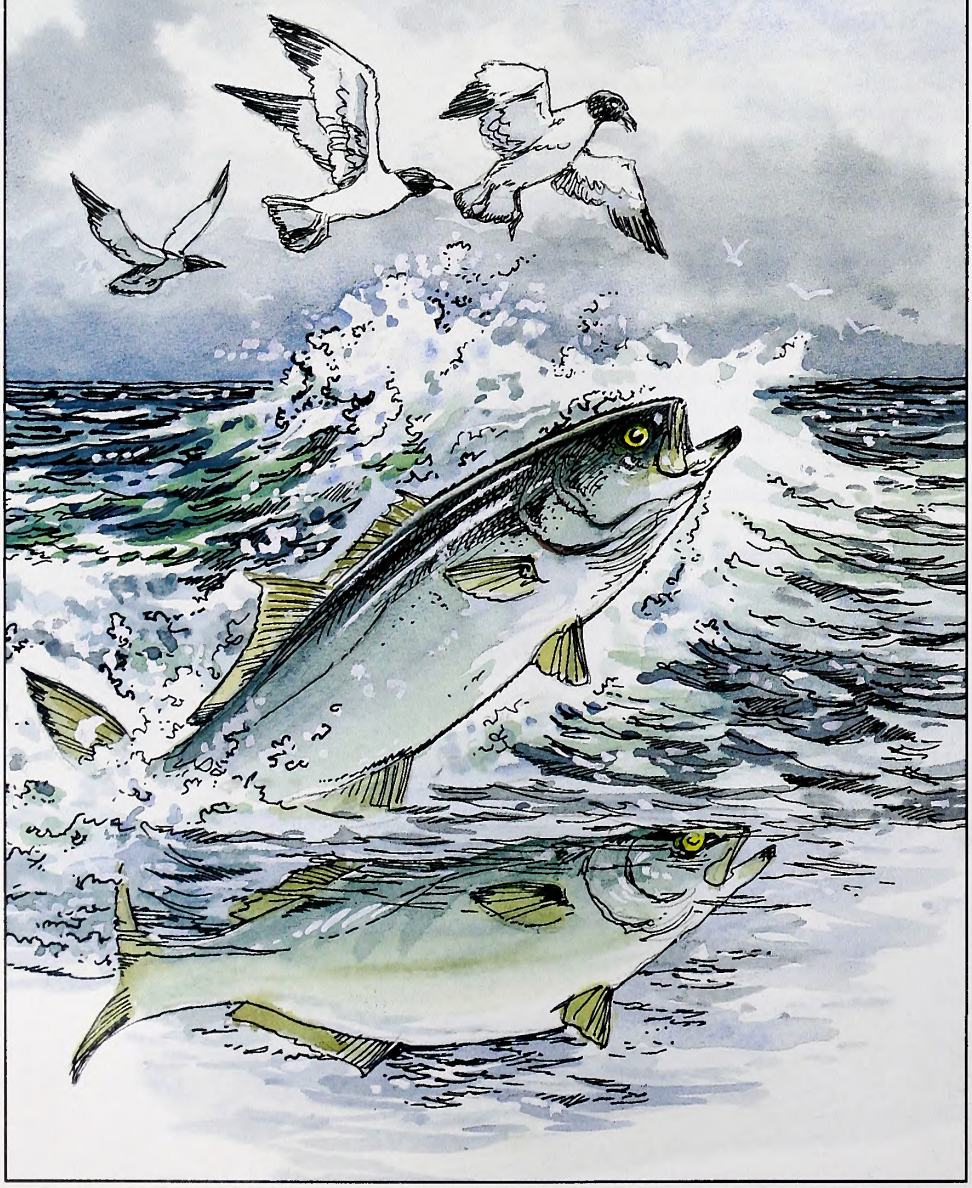
When is the best time to go? Probably every fisherman has a different answer. For some the very best time is just after a big storm, especially a Nor'easter that moves big timbers along the beach and carves out new holes and pockets in the surf.

In autumn the weather can be hot with biting mosquitoes and flies, or it can be rainy, windy and cold. Go prepared for both extremes. Take extra clothes because wet clothing takes a long time to dry. A battery-powered radio is handy for weather forecasts, and cellular phones are necessary for making calls. And remember that there are no stores on Cape Lookout National Seashore.

Surf fishing requires standing in water knee deep to waist deep with wind blowing and waves crashing around you and sea spray everywhere. A good pair of hip boots or waders is essential, and so is a rain jacket. Even in fair weather the jacket is necessary to fend off the unexpected wave as well as sea spray.

Ferries and Cabins

The National Park Service, which administers the seashore's three undeveloped islands, can provide valuble information to help you plan a trip. Obtain information on ferries, cabins and camping from Cape Lookout National Seashore, 131 Charles St., Harkers Island, N.C. 28531. Telephone: (252) 728-2250. Web site: http://www.nps.gov/calo/



No surf-fishing trip for this group would be complete without gourmet breakfasts cooked on the beach. With propane stoves, fold-out tables, and folding lawn chairs, we did it in style. Giant breakfasts of ham, bacon, sausage, livermush, eggs, apples, potatoes, onions and toasted hamburger buns, plus coffee and juices strained our stomachs but sweetened our moods. They were outstanding meals long to be remembered.

It was a good time to regale each other with stories about previous fishing trips. Hayden Simmerson and Webster Collett, the two original members of the group, told of making trips such as this since 1964. On those early trips they hunted ducks in the mornings and fished in the afternoons.

When there were only two or three fishermen on the trips, they lived on the beach in the backs of their vehicles. Later, as the size of the group grew, they needed more gear, food and living space. Also, some of the more accessible places such as Nags Head and Hatteras became more crowded. Over time the fishermen sought the accommodation of rustic cabins and greater remoteness and found what they were looking for at Cape Lookout.

One October Thursday, after coming down to the island for a long weekend, they saw birds working far from shore. By early afternoon the fish had moved closer to shore, and it became obvious that it was a tremendous school of big bluefish.

"By late afternoon the bluefish were chasing spot, croaker, flounder and some speckled trout as big as 3 pounds," Hayden Simmerson said enthusiastically. "They actually chased some of them right up onto the beach. We filled one cooler with 11 of those 3-pound trout the bluefish had chased onto the beach. Then we started fishing for them.

"The blues were big ones, about 20 pounds, and they broke a lot of our tackle. Then we threw out treble hooks with weights and caught spots. We used them as bait to catch the big bluefish. All the bluefish were above 15 pounds. We had great fishing Friday night and all day Saturday. Webster even caught one big bluefish on a pyramid sinker with no hook! That fish bit the sinker and would not let go, even when pulled onto the beach."

Someone else told of a trip on which they had given up fishing because of a heavy surf. As they were leaving for the day, they gave two bluefish to a couple of die-hard fishermen for use as bait. Within a few minutes they had caught two monster channel bass weighing 47 and 48 pounds.

Several members remembered catching big fish in the surf. The biggest was Don Sayers's 125-pound shark, caught while he was fishing with a mullet bait for big channel bass. Afterward he caught a 29-pound channel bass, and Dr. Thompson landed a 28-pounder.

There were stories, too, of 20-pound striped bass caught in the surf years ago. As the anglers told of these great fish of yesteryear, they lamented the fact that they had caught neither large striped bass nor large channel bass in recent years.

With the bluefish, flounder and puppy drum we had saved from Thursday and Friday we were prepared for the Friday night banquet—a fish fry feast. It featured not only good food but also a new round of stories and jokes. The week had been a great time of adventure, which was now coming to a close.

Friday afternoon at high tide we had stood knee deep in water on the peninsula at the extreme southern tip of the island. The fishing was fantastic. We were catching puppy drum, flounder, black drum and bluefish. The birds were frantically calling, diving and feeding in front of us. The wind was blowing, the surf was pounding around us and sea spray was all over us. Not only were the waves crashing in front of us, but to my surprise they were rolling in from the back side of the peninsula and breaking on that side of us too. The breakers from the front and back were crashing together all around us.

With the wind blowing, waves crashing, birds diving and fish eagerly attacking our baits and lures, it was one of my greatest fishing experiences ever. And the best part is that it is available to anybody who wants to try it. ⊠

Blustery conditions one *day (left) can be replaced by fair weather the next (bottom) on a November day on Cape Lookout. Surf fishermen should be prepared for either, or for both, although the rewards can be worth it, as Webster Collett and Tommy Thompson found (below).*

Lost in Angola Bay

Beyond the rampart of pond pine, cane and briers lay B. W. Wells' great evergreen shrub bog. It looked formidable. It looked impossible.

written by Rodney Foushee

The discussions began in various ways but always ended the same: "Why do you want to go to Angola Bay?"

I guess I could have said, "Because it's there." Right there in southeastern North Carolina, 21,000 acres of mostly intact pocosin forest owned by the N.C. Wildlife Resources Commission and managed as a game land. It was right there on page 10 of the North Carolina Game Lands map book. I pointed it out to them, an odd-shaped area straddling the Pender County-Duplin County line. They would nod. "Yep, sure is," they'd say.

But then they'd return to that inevitable question: "Why do you want to go there?"

I had first learned of Angola Bay a few years ago while covering a forest fire in southeastern North Carolina and wanted to travel to this remote, intriguing place to learn more about its ecological diversity. It's a public property, after all, and has been a wildlife refuge for more than 50 years. I figured there'd be a gold mine of information available about the place.

Instead, as I queried a half-dozen or so Wildlife Commission biologists, foresters and technicians, I was being treated as if I had some kind of mental illness. They looked at me with all the warmth of a posted sign during hunting season.

Angola Bay existed, they conceded, but had I noticed the warning in capital letters across the page? "NOTE! NO PUBLIC ROAD ACCESS." Since the 1950s, the Wildlife Commission has tried to negotiate with owners of surrounding property some sort of access to this remote game land, but all attempts have been unsuccessful.

"There's no roads, and there's nothing to see in Angola Bay even if there were."

"What about the hunting?" I asked. Angola Bay has offered a large block of habitat for black bears and deer for centuries. Maybe I wanted to head down there after the first frost had killed off some of the biting insects and try my luck from a tree stand.

"You'd have better luck taking a deer with a bayonet in Angola Bay," one veteran technician told me.

Maybe I should have listened to them after all.

From the air, Angola Bay, with a diameter of more than 10 miles and no roads or visible trails, takes the form of a limitless green wilderness. Even in the dead of winter, this shrub bog is as green as the finest summer garden. But on the ground, Angola Bay's deception is quickly revealed. Maintained by fire and water, a pocosin can be one of the most inhospitable places on earth (see "The Swamp That Burns," February 1998).

Since the earliest times, humans have universally avoided these nearly impenetrable

WILLIAMS LEA

Few places are *more inhospitable and wild than the pocosins of eastern North Carolina (right). Straddling the Pender-Duplin County line, Angola Bay represents one of the finest examples of pocosin habitat remaining untamed by humans.*

wetlands that are more akin to tropical jungles than temperate forests. Native Americans long ago discerned the difference between an ordinary swamp and a pocosin, or "swamp on a hill," and for the most part they gave these formidable places a wide berth, although they did occasionally set fire to the combustible peat bogs to flush out deer, bear and other game for easy pickings. Formed from the remains of ancient forests, these peat-filled bogs proved an obstacle to any but the most determined traveler. The first European settlers also quickly developed a healthy respect for pocosins, which they also called bays.

Nothing resembling a complete history of Angola Bay exists, but fragments of surveys, titles and other government documents can be used to piece together a brief summary of the place. Though the origin of the name is unknown, the term Angola Bay was in common use as early as the late 1700s. It was also called the Great Pocosin and was included with Holly Shelter Pocosin on many maps until the early 1800s. Considered "worthless" swampland, Angola Bay, along with nearby Holly Shelter Bay, has been owned by the state of North Carolina for more than 150 years. First assigned to the state Literary Board in 1825, the bulk of these swamplands were never sold, but logging was allowed, with the proceeds used to raise money for public schools.

In 1942, Angola Bay was transferred from the state Department of Education to the Department of Conservation and Development, the predecessor of the present-day Wildlife Resources Commission.

Few people have willingly traveled to the center of Angola Bay. One notable exception was ecologist B.W. Wells, who visited Angola in the early part of this century and published one of the few written accounts of the place in his 1932 masterpiece *The Natural Gardens of North Carolina*.

KEN TAYLOR

***Amid the jungle-like** thickets of Angola Bay, the delicate Carolina jessamine blooms. Like all pocosins, Angola Bay is dominated by a myriad of evergreen shrubs and vines that form a nearly impenetrable barrier for the inexperienced visitor.*

> "We were going into one of the great evergreen shrub bogs of eastern North Carolina (Angola Bay in Pender County) to visit the virgin longleaf pine trees, which stand on a small sand island in the central part of the area. But long before we got to the pine trees, we found this wide, monotonous morass a thing impressive and distinctive in itself. The deeper we got into it both horizontally and vertically (for in spots we were thigh deep) the more of a "lost world" aspect it attained in our minds. Had one of those Mesozoic reptiles approached through the thin stand of pocosin pines, floundering his uncanny body amid this peatty mire, we should not have been greatly surprised, so perfectly would such a beast have fitted this unique habitat."

Angola Bay is likely drier than when Wells first visited the pocosin, because surrounding forestlands have been ditched and drained. However, little else of this wilderness has likely changed in the past 60 or even 200 years.

Which was really my motive for going there. How many places do you know of that haven't changed in the last 10 years, much less 200 years? The trick was to find someone brave enough (some might say nutty enough) and knowledgeable enough about the area to take me there. It took me a few months, but I finally convinced wildlife technician Ron Sanders to take me to the darkest heart of Angola Bay...well, at least to its edge.

In early April, Sanders met *Wildlife in North Carolina* photographer Ken Taylor and me at Holly Shelter Depot, and after studying some old maps of the area, we drove the 10 or so miles overland to Angola. Sanders had previously made arrangements with a local landowner to cross his property, and as we traversed a large drainage ditch, we saw the familiar metal Wildlife Commission game land signs.

"Well, that's it," Ron said almost apologetically, pointing to the 20-foot-high wall of green that began just beyond the drainage ditch and seemed to continue to the horizon, wherever that was. "Sorry to disappoint you."

There it was—Angola Bay. Beyond this rampart of pond pine, cane and briers lay Dr. Wells' great evergreen shrub bog. It looked formidable. It looked impossible.

Ron was already making lunch plans

KEN TAYLOR

***With a diameter of** more than 10 miles, and no roads or visible trails, Angola Bay stands as proof that there is wilderness left in North Carolina.*

when I interjected: "Well, can we at least walk along the outer road?" After all, I had driven all the way from Raleigh to explore this place. Ron shrugged, and we set off. Within minutes we found a small trail that conveniently twisted its way into the bay's depths. This was likely a deer trail that had been slightly enlarged by a maddened hunter with an ax or machete during the previous hunting season. The trail constricted around us like a serpent as we entered the morass. The peat-filled ground trembled beneath our feet as we slowly picked our way through thickets of gallberry and cane that blocked any hope of a view. We could see barely more than a few feet in front of us. Looking up, we could make out the clouded sky where an occasional stunted pond pine (*Pinus serotina*) made its twisted way above the canopy.

I could only guess at the cardinal direction of our bearing, since I had foolishly left my compass in the truck. Thin pines shielded an overcast sky. But I dimly sensed we were making the proper way toward the Blue Ridge, a remnant sand dune that forms a low sandy ridge in the middle of Angola Bay. Elevated above the surrounding pocosin, the ridge hosts a small stand of old-growth longleaf pine.

"I see a clearing," I told my patient companions more than once. "The Blue Ridge can't be much farther." They just mumbled some expletives, and we continued to tromp along the mushy trail. The deeper we went into the bog, the more claustrophobic it got. With the temperature pushing 90 degrees without a cooling breeze, and with insects crawling freely on us, this place was beginning to try our patience.

As we picked our way through the hostile terrain, the conversation kept returning to stories of being lost in such a place. There are plenty of tales of people getting lost in eastern North Carolina bays and never being heard from again. One of the largest objects lost in a pocosin was a World War II observation plane, which crashed into nearby Holly Shelter Bay in 1943. Though crew members managed to get out alive, the O-47 plane was practically swallowed up by the bay. The plane wasn't spotted again until 1978, when a Marine Corps colonel accidentally discovered it while flying over the area.

No missing airplanes have yet been found in Angola Bay, but there are rumors of an old logging locomotive still in the pocosin. Loggers using small-gauge rail lines managed to conquer the southern portion of Angola Bay, which originally encompassed 50,000 acres. Ditched and drained, the southern area now serves as pine plantation. Though the edges of the bay were cleared of timber, the northern portion of Angola was never truly conquered by humans.

After twisting our way maybe a mile into this pocosin hell, my partners had nearly reached their limits. The forest seemed to be becoming more open—but this was another one of Angola's deceptions. "We must be getting close," I said hopefully as I climbed on top of a scorched deadfall to survey the area ahead of us.

"Forget the Blue Ridge!" Ron suddenly exclaimed. Reluctantly I agreed to turn back. We were heading nowhere at a snail's pace, and, of course, we had to make the trek back.

With my hands and face scratched by briers and with ticks having free rein over much of my upper torso, I stopped for a moment to watch how long it would take my boot print to fill with brown water from the oozing peat. As I scribbled a few notes, I looked up. My companions were gone. I still had the reassurance of the trail before me, and they couldn't be more than 50 feet ahead, but Angola's dense foliage and peat ground dampened any sound.

I was suddenly alone in this wilderness and would not have been the least bit surprised to see one of Wells' prehistoric beasts rumble out of the thickets around me. The only sounds were those of songbirds in the brush. There were none of the familiar human sounds—the hum of traffic, the sound of a jet engine overhead. I was lost—lost in time, lost in nature, lost in Angola Bay.

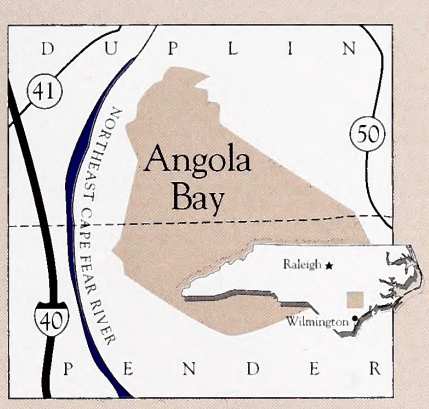
Yet it was strangely comforting. Alone in this deep, forbidding place, I could escape the breakneck pace of modern life. Alone, I felt the possibility of finding myself. I relaxed and lingered for a moment more to appreciate the magic of this rare piece of solitude. I rejoiced in the sweet smell of the humic soil and the heat of the day, the pounding of a woodpecker in the top of a twisted pond pine in the distance, and the sweet fragrance of yellow jessamine.

When I finally decided to leave, the peaty ground seemed positively springy as I made my way back down the trail.

When I caught up with my companions, I greeted them like long-lost friends. Close to the edge of the bay we encountered hatches of insects and more dragonflies than I had ever seen. We discovered some bobcat scat along the last 100 feet of the trail, with the tightly woven hairs of marsh rabbits and wood rat bones inside. A red-tailed hawk greeted us as we emerged on the dirt road back into the open, back into the human domain.

Driving home, I thought about my brief attempt at taking the measure of Angola Bay. True, I had failed to reach its center, but I had learned something else. We often lament the loss of wild places and the way things "used to be." But there is solace in knowing that a place too tough for humans to tame still exists in eastern North Carolina. There is wilderness left—Angola Bay stands as absolute proof. ⊠

So You Want to Visit a Pocosin



Once covering more than 2 million acres, pocosins and Carolina bays are now among the most threatened ecosystems in the Southeast. Formed over thousands of years by the accumulation of peat and fire, two-thirds of these wetlands have been drained or altered. Though few animal species live exclusively in pocosins, these large blocks of forest serve as important refuges for large mammals, including black bears and white-tailed deer, as well as numerous birds and smaller species. In their undisturbed state, these peat wetlands also provide a critical link in the system of storage and release of water in the Coastal Plain.

Though an excellent example of pocosin habitat, Angola Bay is far too inaccessible for the average outdoor enthusiast. One regular pocosin visitor, Mike Schafale, a botanist with the N.C. Natural Heritage Program, advises that it's better to taste a pocosin without swallowing one first.

Both Jones Lake State Park, near Elizabethtown, and the Croatan National Forest, near New Bern, offer excellent opportunities to experience a pocosin safely. Jones Lake [telephone-(910) 588-4550] features a nature trail through a stretch of pocosin near the lake; extensive roads in the Croatan [telephone - (252) 638-5628] allow you to view this inhospitable terrain from the safety of your vehicle.

Now, if you do get a hankering for the full pocosin experience, don't forget a map, compass, plenty of water and tick spray, a machete, snake chaps, a homing beacon, a GPS unit and a cellular phone. You may need all these and more before it's over.

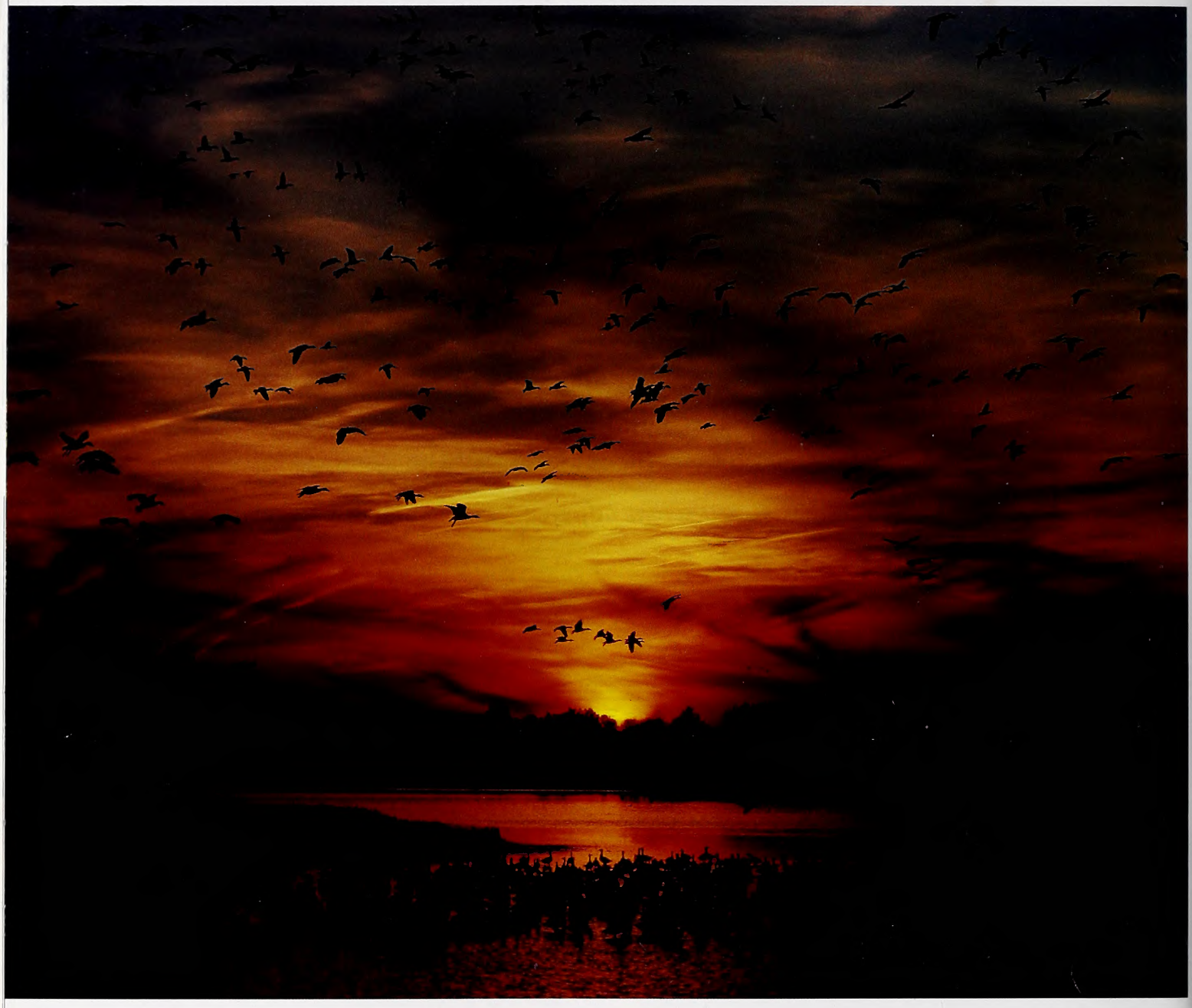
The Season of COLOR

For different photographers, autumn says different things. What does it say to you?

Summer passes to fall and nature gradually ignites in a spectacular show of intense color. It's a world made for the photographer, either amateur or professional. Which is why we asked a handful of our favorite photographers to interpret autumn, in words and pictures. We think you'll like what they have to offer.

GEORGE HUMPHRIES

"If I had to pick a favorite time to photograph, it would be autumn. The air is crisper in the fall, the sky bluer and there is a sense of urgency not found at any other time of the year. It is one of the great wonders to witness the plants and trees begin to turn various hues. To be up high in the mountains in the fall of the year when the first glow of dawn envelops the autumn foliage and creeps across the fog-filled valleys below is an experience hard to surpass. My senses heighten in the autumn and I do my best photography then."



F. EUGENE HESTER

"Autumn is an exciting time for waterfowl migration. With the approach of winter, snow geese leave their nesting grounds in northern Canada and travel south in great flocks. In October and November many of the geese have arrived in North Carolina to spend the winter. Their arrival signals a change of seasons and a renewal of nature's bounty. Their flocks are always spectacular, but even more so when thousands of calling snow geese are silhouetted against an autumn sunset."

JACK DERMID

"Autumn has a special flavor, a real flavor that is locked in a fruit or nut until released by the palate. The flavor is so real and distinct that, once savored, it is sealed forever in the memory. The flavor that says autumn may be a muscadine to one person, a hickory nut to someone else, a crisp mountain apple to another."

SCOTT TAYLOR

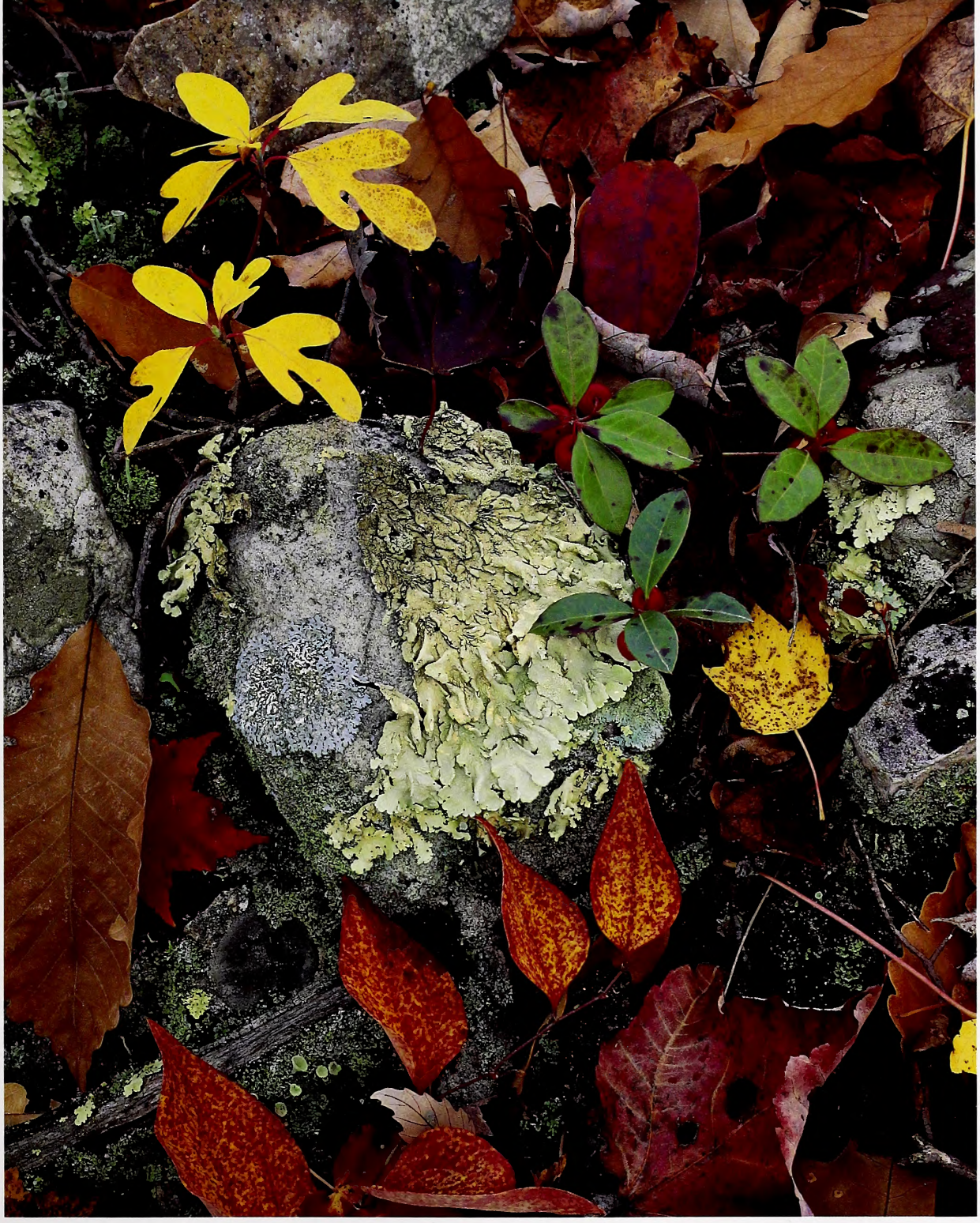
"Crisp fall air chills the seas, bringing the big fish to the Outer Banks of North Carolina. The Point of Cape Hatteras is famous for its superb fall fishing. Fishermen from across the country crowd access ramps, lock their hubs and descend onto the point. The scene comes alive as warriors clad in camouflage waders maneuver into casting position, hoping to land a prize."

DERRICK HAMRICK

"Cool nights and mild, blue-sky days bring forth the arrival of migrating birds, an autumn event that has gone on since the beginning of time. This natural phenomenon begins in the minds of the birds, with their internal compasses locked on a southward bearing and a harvest moon to guide the way."

DAVE MASLOWSKI

"A blue jay fairly sums up autumn. Its plumage is as vibrant as the foliage, its crest as crisp as the morning air and its swagger reflects the renewed vitality of the season. This jay shouts its exuberance to the world."



HAL HORWITZ

"I was at once struck by the unusually beautiful lichen, and then noticed the surroundings—wintergreen in fruit, wonderful yellow leaves of sassafras and the greenbrier vine. Fall's colors are different from those which have pleased us the past few months. Instead of looking up for fall colors, I look down. There are always surprises to be discovered on the ground—happy communities of plants, the last flowers of the season, fruits of flowers that bloomed earlier. Searching road banks, wet seeps and the forest floor carefully in the fall always results in discovering an astounding medley of shapes, colors and textures."

DANCING with the WIDOWMAKER

Things that go bump in the night can also kill the unwary backpacker. You don't have to be paranoid to be aware of what experienced outdoorsmen call widowmakers.

written and photographed by Burt Kornegay ©1998

On a clear night in late October two years ago while camping alone high in the Cheoah Mountains off the Appalachian Trail, I rolled out my sleeping bag under the stars and slid into its snug interior, eager for a much-needed night's sleep. Before pulling the hood up over my head, I turned on my side and lingered, propped on one elbow, watching through the leafless trees as a full moon rose slowly over the black outline of the Nantahala Mountains, 10 miles to the east. There was not a cloud to be seen; the night air was perfectly still; the moon's soft glow illuminated the quiet forest around me. And at that tranquil moment, without the slightest warning, an oak tree a foot thick and 40 feet tall crashed to the ground just in front of where I lay. It fell so hard that had I been a little farther down the slope, its heavy trunk would have turned my restful night's sleep into the sleep of the dead. (As it was, the scare nearly stopped my heart.)

The next morning I examined the oak and found that, suffering from root rot, it had simply broken free from its earthy moorings and dropped.

My close call with the falling oak in the Cheoahs has not been unique. One August night several years ago, when camping in the Unicoi Mountains, I was roused from sleep when a giant eastern hemlock on the slope behind me laboriously smashed its way to earth, taking other trees with it in a cacophony of pops, cracks and rending branches. One evening, a couple of years before that, on the North Carolina Bartram Trail, a whole group of us jumped up from supper around the fire when an old black locust on the edge of camp, choosing that moment to obey gravity's pull, snapped midway up its trunk with a rifle-shot clap. Falling trees do not limit themselves to landing on forest floors either. Twice I've had trees splash behind me—once into a river, once into a lake—just after I had canoed past the spot.

***The southern mountains** beckon to the adventurous and to lovers of natural beauty, but they also hold the possibility of danger for those unprepared for the rigors of the trail.*

Those who spend much time in our southern woodlands know that trees and branches fall with surprising frequency. It happens most often in older forests, with dead snags and aging crowns, and in forests that have been injured by insects, disease, fire or flood. The next time you are hiking in the woods, stop and look around: every single trunk or branch or woody chunk that you see lying on the ground fell there. And some of them landed with the force of a club. The loggers and woodsmen of yesteryear were well aware of the danger posed to humans from above. They even had a special name for such plummeting forest debris: widowmakers.

But it doesn't take a heavy club to make your spouse a widow (or widower); a slender branch will do. Over the years I've come upon more widowmaking "spears" than I can count impaled a foot deep in the earth, as if someone had hurled them from the trees above. The day after Hurricane Opal howled across our mountains in October 1995 the forest floor looked like a pincushion. Imagine the injury one of these missiles might have inflicted had you come between it and the ground!

Just as there is no way to avoid mosquitoes and poison ivy completely when you venture into the woods, so there is no guaranteed way to avoid widowmakers. Nature is always ridding itself of dead and weak growth, even on perfectly still days. But at those times when widowmakers are most likely to fall—during the onset of high winds—you can reduce the chances of being struck by holing up in a trail shelter or beneath a rocky overhang, or by making camp in an open space or within a grove of young trees. Also,

the next time you set up your tent or roll out your sleeping bag for the night, look up. If you see a large, dead branch hanging right there above you like the Sword of Damocles, find another place to sleep.

Having worked for years as a wilderness guide, I know that most campers head into the forest never giving widowmakers a thought. If they are thinking about possible dangers, campers usually fear being hurt by one of what I've come to call "the infamous four"—bears, snakes, alligators and backwoods psychopaths. True, all of us have heard at one time or another about a camper being attacked by one of these beasts. It usually happens either in a public campground or at a heavily used trail shelter, because these are the kinds of places that attract panhandling animals, as well as two-legged troublemakers. But such attacks make the news precisely because they are rare. In the more than 300 wilderness trips that I have run—from the Great Smoky Mountains to the Okefenokee Swamp, from Oregon's lush forests to the deserts of Texas—involving some 3,000 people all told, I have yet to see anyone attacked by anything other than yellow jackets or hornets. I doubt I ever will.

Besides widowmakers, what have I learned to fear in the wilds? What are the things out there that most endanger you? This may come as a surprise, but I think the single greatest threat in the woods is not "out there" at all. Rather, the threat is "in here"—that is, within our own bodies and minds, especially when they have been impaired by fatigue or ignorance or fear.

Fatigue is probably the most common cause of wilderness injuries, and it works in three ways. First, like a debilitating disease, fatigue can deprive the body of its accustomed strength and coordination, making it prone to missteps and accidents. When campers are exhausted, their balance becomes less sure, their knees tremble, their handgrips weaken, their paddle strokes flag, their reflexes grow clumsy and slow. Fatigue can impair the performance of the most fit of adventurers, when, in overconfidence, they push themselves beyond the limits of their strength and stamina. And it most assuredly endangers the many outdoor enthusiasts who go from the couch to the camp, from the mall to the mountains, not realizing that sedentary living has unfitted them for a trek in the wilds. True, by providing yourself with the latest high-tech camping equipment and clothing, you can pad yourself from "bumps against nature-in-the-raw," as Aldo Leopold once put it. But even thus accoutered, if you are out of shape when out of doors, fatigue is just around the bend in the trail.

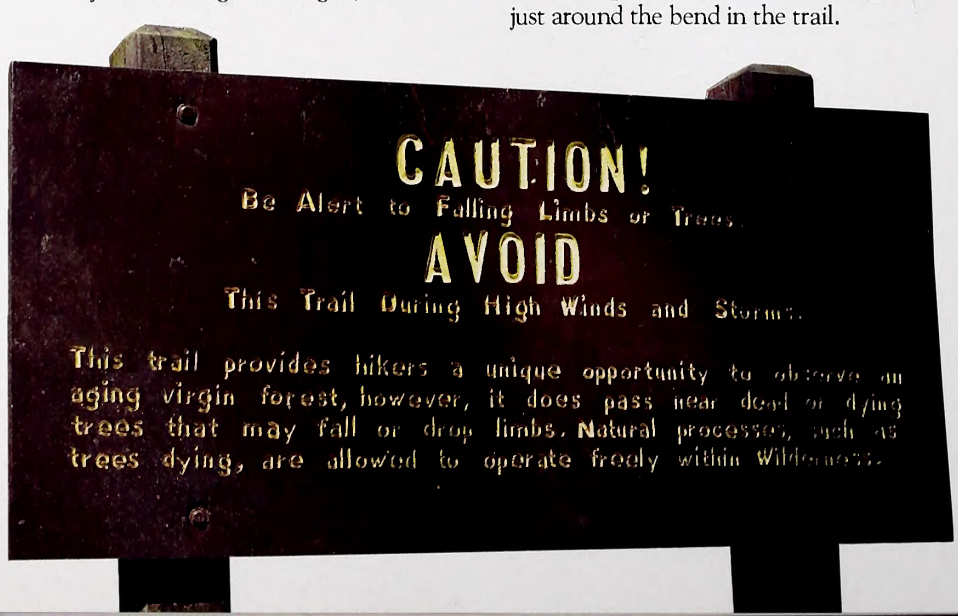
***Widowmakers come in** several varieties. This sharp, widow-making "spear" fell out of a tree and buried itself 8 inches deep in the ground. Needless to say, such a flying missile could do a lot of damage to an unwary camper.*

Second, fatigue can muddle the mind like a drug, causing campers to make the wrong decisions or do witless things. Weary campers often ignore the signs of worsening weather, blindly follow the person in front of them, take risky short-cuts and pay no attention to how their companions are faring. Weary campers tend, paradoxically, to hurry up when they should slow down (run that last Class III rapid of the day without bothering to scout it). They also slow down when they should hurry up (too tired to climb down off a rocky point, even though a thunderstorm is on the way).

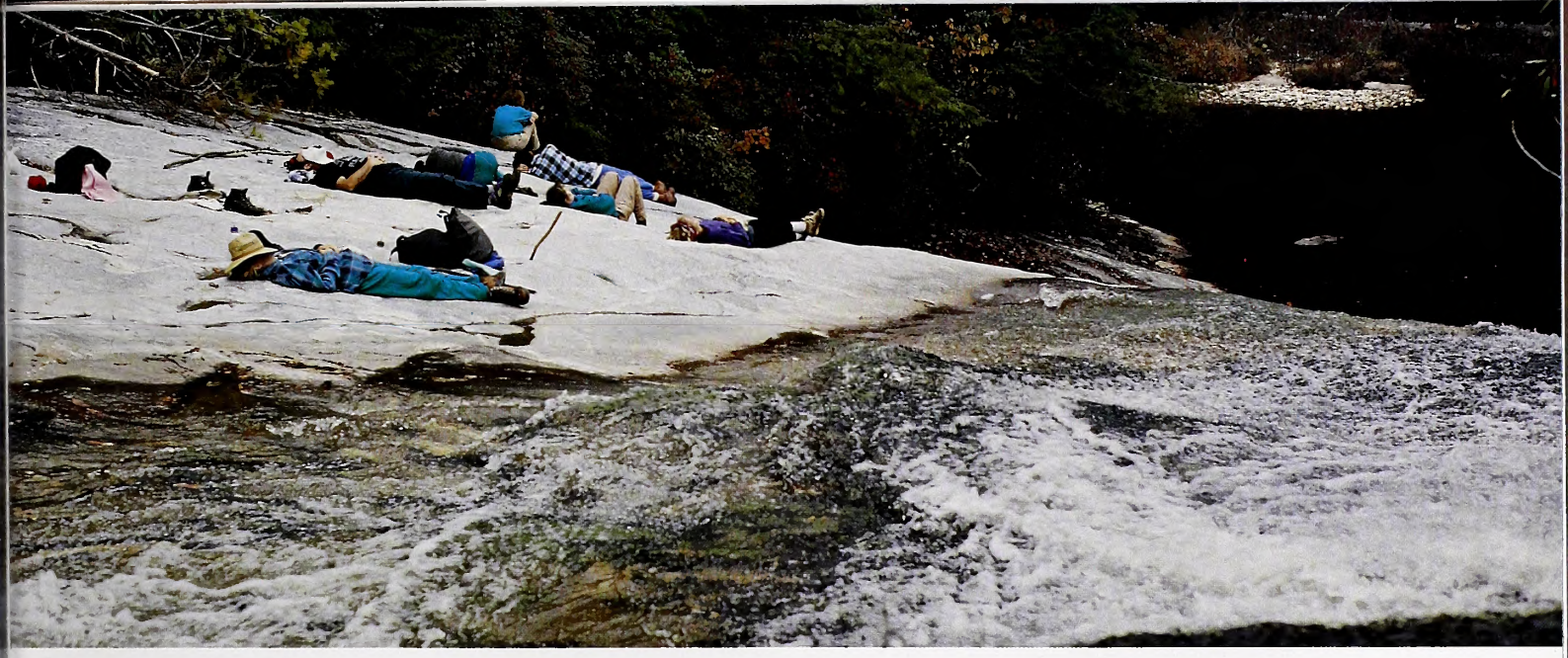
Third, fatigue, combined with exposure to cold, wet, windy weather, can make campers vulnerable to a life-threatening condition that I call "cold fatigue," but which is more commonly known as *hypothermia*. Not the infamous four, not flashfloods, blizzards, avalanches, storms, not even widowmakers are the greatest threats to humans in the wilds—hypothermia is. The word hypothermia means low heat; it is the exhaustion of the body's ability to heat itself following inadequate protection from the cold, resulting in a lowering of the temperature of the vital organs, including the brain. A drop of just a few degrees in one's core temperature from the normal of 98.6 degrees Fahrenheit can impair one's strength, coordination and thought. A drop of 10 degrees can cause physical collapse, unconsciousness and death.

Do not think that you are safe from hypothermia just because you camp in the warm, sunny South. Most cases of hypothermia occur when the temperature is above freezing and when it is windy and wet—common conditions in our southern wilds.

Once, backpacking in the Great Smokies on a drizzly day in May, with the temperature in the 50s, a friend and I hiked doggedly uphill all morning long to make it to a lookout point by lunch. I was sweat soaked, tired and hungry when we topped out on the main ridge at 1:30 p.m. A cold wind buffeted us, I began shivering, and my body temperature dropped. I wanted to get out of my wet things and into dry, windproof clothing. But to my dismay I found that my fumbling fingers had lost so much strength and dexterity that I could not make them do the simplest tasks, such as unbutton my shirt or open the zippered pocket of my pack. I had to rely on my friend—for some reason less affected by the cold than I was—to do these things. To generate inner warmth I redressed, ate fast



***This warning sign** neatly sums up the dangers of falling trees in many mountain forested areas, especially in the old-growth portions. The rewards of seeing these old forests outweigh the dangers, however.*



***Widowmakers can also** come in the form of fatigue and cold. To keep fatigue at bay, take frequent breaks, as these hikers are doing at Riding Ford Falls, in Panthertown Valley, Nantahala National Forest. To avoid hypothermia, be prepared for wintry weather even as late as mid-May in the high country of the Southern Appalachians.*

and hiked towards a sheltered cove, skipping lunch with a view.

Since judgment is one of the first things impaired by fatigue in any of its forms, how do we know when our companions or we are becoming dangerously tired or cold? Although there is no simple answer to this question, the onset of fatigue and hypothermia is often revealed by the appearance of a family of traits that professional guides call "the umbles"—that is, the mumbles, grumbles, bumbles, fumbles, stumbles and tumbles. And it is the appearance of the umbles that you should keep an eye peeled for, both in yourself and in your companions, especially when the day has been long and strenuous and the weather raw. Under such conditions, if you start to hear mumblings and rumblings from your fellow hikers; if you see them stumbling more than usual, or fumbling with their gear; if you feel a shivering in your body that won't go away; or if you see people stop doing the simple things necessary to take care of themselves—such as putting their raingear back on at the start of still another rain, grumbling, "We're already wet, why bother?"—know that the umbles have arrived and that fatigue has come with them.

To keep fatigue at bay, pace yourself through the day and rest frequently, eat snacks and drink plenty of water. Keep in mind that fatigue-caused accidents tend to happen at the two times when people are most likely to be dehydrated and hungry—just before lunch and when making the final mile of trail for the day. Additionally, along with rain gear, in cold, wet weather you should wear wool clothing or one of wool's synthetic substitutes, such as polypropylene, Thermax, or Polarfleece. (Wet cotton will simply wick your body heat away.) Finally, if in spite of your precautions the umbles do appear, the safe course is to stop then and there, eat a snack, drink water and make camp.

Along with fatigue, ignorance and fear are two common contributors to wilderness accidents, with ignorance (of the woods and of wilderness skills) often setting the stage for fear. Once I was hiking behind four strapping teenage boys when I heard them yell at the sudden appearance of a wild animal on the trail. The boys panicked and stampeded back toward me, dropping their packs, tripping over rocks, roots and each other, and knocking me aside. Had the four presented a united front, they would have intimidated a bear! But they were spooked and routed by nothing more than a harmless hen grouse. A woods-wise person would have known that it is not unusual for a grouse to dart out in front of hikers, flopping and dragging her wings as if injured, to divert them from her young. But these boys, city born and bred, simply saw something brown and ran.

Because no one was hurt, the incident makes a funny story. But any wilderness search-and-rescue team can tell you similar stories that do not have funny endings. The stories commonly go like this: a novice solo backpacker becomes spooked in the woods. Perhaps he has been buffeted by a storm or has become disoriented in fog. He gives in to fear, abandons his pack, which contains everything he needs to sustain him and runs through the woods desperate to get out until, lost, he staggers to his knees and succumbs to hypothermia or runs blindly off a cliff.

More insidiously, a low-grade fear in the form of apprehension or nervousness while in the woods can prompt the inexperienced wilderness traveler to continue pushing on, ignoring the signs of fatigue or of bad weather, until a simple tumble, bumble or fumble turns the day's outing into a nightmare. ⊠

Burt Kornegay is a wilderness outfitter and guide who runs Slickrock Expeditions in Cullowhee.

Weary of the same old, same old? Varying your hunting techniques during the day can restore your hunting pleasure and may even put that wall-hanger within reach.

written and photographed by
Gerald Almy ©1998

Too often in deer hunting, as in so many other things in life, we get stuck in ruts. Habit, past success and tradition make it all too tempting to simply go out and hunt exactly the same way every time. I've been as guilty as anyone of this, and I'm sure it's cost me many good bucks, simply because I wasn't using the most appropriate, highest-percentage hunting method. Instead, I simply went through the same old routine without stopping to analyze the time of day, stage of the hunting season, hunting pressure, temperature, wind velocity, light intensity, ground moisture and other factors.

If you are willing to choose your strategy each day based on what's most appropriate for the given conditions, and vary that strategy throughout the day using several methods, chances are you can increase both the number of opportunities you have to bag deer and the quality of animals you see. Varying your hunting strategies lets you get the most of each technique by using it when it is most likely to be effective, even if that means just for a few hours during certain days of the season. Mixing your strategies also prevents deer in your hunting areas from learning your hunting routine and easily avoiding you. For example, if all the members of a hunting club stand-hunt in the mornings and evenings and rest back at camp during midday hours, the older, savvy bucks will learn that they

Mix Your Deer-Hunting Strategies

INSET PHOTO BY WILLIAM S. LEA

***Few animals are** more studied and hunted than the white-tailed deer. Nowadays, it's not unusual for the average deer hunter's strategy to be determined by moon phases, breeding cycles, weather conditions and feeding routines.*

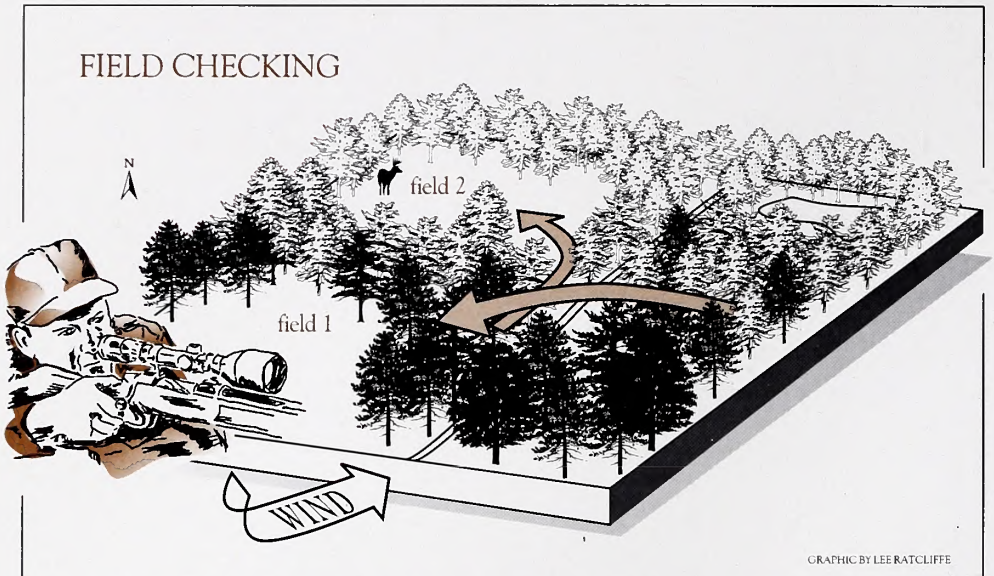
can feed, check scrapes and trail does from 11 a.m. to 2 p.m. If a brushy wood lot is often pushed with a drive shortly after lunch, the biggest bucks will learn to avoid that spot during that time.

Not only is mixing techniques a good way to increase the number of bucks you see, it's also fun. Stand-hunting, for example, is a fascinating way to pursue bucks. But after three or four days of dawn-to-dusk sitting, let's face it, most of us are ready to move a bit and try something different. This urge to abandon my stand temporarily was what first got me started on the idea of multiple-tactic deer hunting. I had shivered through three cold mornings in a row on a mountainside stand without seeing a buck, when around 9 a.m. I decided I would try something else. I decided to hunt along the bench at the top edge of the hollows that furrowed the mountainside, peering carefully down into each one as I approached it.

The third draw I checked out showed the wisdom of switching strategies. A buck and doe were easing up the hill on the opposite side of the hollow, 150 yards away. After calming my nerves, I braced myself against a stump, found the deer in the cross hairs and squeezed off. The 165-grain Boat-Tail found its mark, and the heavy six-pointer went down cleanly.

Since that hunt, I've used this combination of tactics many times with good success on other hunts in the mountains as well as the rolling hills of the Piedmont and the eastern lowlands. I take a stand in a likely transition zone between feeding and bedding areas for the first hour or two of daylight, then carefully move closer to the bedding areas during late morning and midday hours.

Another variation on this mixture of



GRAPHIC BY LEE RATCLIFFE

***Toward the end** of an uneventful day, some hunters will quietly hustle to nearby fields or food plots to better their odds of seeing deer. As shown in the above illustration, hunters can use the wind to their advantage by checking fields 1 and 2 from directions that keep scent away from the quarry. Deer have a remarkable sense of smell. Hunters who fail to take into account the direction their scent is traveling will likely kill nothing but time.*

strategies is to stalk-hunt during the entire morning and watch from a stand in the afternoon. This is a particularly effective plan if you are hunting areas that get only light-to-moderate hunting pressure and have food plots or fields that deer frequent during the last hour or so of daylight. Waiting quietly in a blind or stand is the best way to intercept these animals as they come in to feed at dusk. But watching these feed areas in the morning is never quite as successful, because you tend to run the animals off, trying to reach the stand before daylight. However, by stalk-hunting, you can often intercept deer by accessing corridors deer use to travel between feeding and bedding areas. You can also find bucks checking their territory and searching for receptive does when there's still a breath of coolness hanging over the land and the sun is low in the sky. The light is also softer then, making it easier to see deer as you ease along. Often, there's some moisture on the forest floor in the morning, too, making it easier to move quietly. In the afternoon, the woods tend to be dry and brittle from the sun beating down all day.

Another time that you should consider stalk-hunting is on windy days. Bucks are wary of traveling in these conditions. They'll be concentrated in bedding areas as well as basins and bowls protected from the main brunt of the wind. Knowing this helps pinpoint their location for you. The movement of the wind blowing brush and trees makes it harder for them to detect your motion as you ease cautiously along. And by keeping the wind in your face, you can approach without having your scent blow toward your quarry.

Stalk-hunting is also good during or just after a light rain or snow. This dampens the woods and allows you to move silently. Stand-hunting may still be a good approach in this situation, but if other conditions also dictate stalking, the quiet woods make it an especially productive tactic.

Though I often choose stalking during a light rain or snowfall, a good time to get on a stand is when a storm is approaching. Deer seem to have built-in barometers and tend to move heavily 12 to 24 hours before a storm arrives. After a bad storm has settled in, you have two options: either go back to camp and wait it out or switch to walking and looking in bedding areas such as thick swamps, evergreen thickets, overgrown home sites and benches just down from ridge tops in mountains.

One variation of the field-watching technique I sometimes put to use is "field checking." This technique involves watching one field crop or food plot in the late afternoon from surrounding brush or woods. If nothing seems to be coming in, I slip back quietly into the brush and then walk or even jog (with an unloaded gun) to another field. Be sure to stop far enough back so the deer won't hear or see you, then creep quietly up on your hands and knees, if necessary, to check it out.

One of my longest-tined 10-pointers was taken by using the field-checking method. With legal shooting time rapidly expiring, I had decided to check three fields in a last-ditch effort. The first two fields held only a few does, but my final destination provided the payoff. Easing up cautiously through the brush on hands and knees, I reached a point where I could glass the area with my binoculars. I couldn't believe my luck. Toward the far edge of the field, several does accompanied a small eight-pointer and a heavy-horned 10-pointer with long tines that towered above the rest of the deer. The 10-pointer's spread didn't look that wide, but the tines were so long, I knew I had to try a shot. However, my too-good-to-be-true situation quickly deteriorated when I discovered the only thing I could draw a bead on was a magnified view of foliage. I didn't want to risk another move, but the fading light forced me to roll the dice. Hunkered down on my belly, I crawled forward about 10 feet to a small opening that provided a clear sight-picture. The deer weren't totally spooked, but they were getting edgy and rapidly proceeding to full alert. Bracing my elbows on the ground, I steadied the aim with my .30/.06, found the spot just at the back edge of the deer's shoulder and lightly touched the trigger. The deer jumped and looked hit, but I fired a second round for insurance. The five-year-old buck didn't have the widest rack I've taken but it was one of the tallest, and he now holds a place of honor on my office wall.

Watching scrapes is another tactic that has brought me success. Scrapes are oval spots that bucks paw out and in which they deposit urine and scent to attract does and make their presence known to other bucks. Look for large primary scrapes or a series of scrapes near the edges of fields and along ridges, benches and trails in the woods. Position your stand downwind and freshen the scrape with estrus scent if you like.

Scrape-watching is not an all-season tactic, but rather one that is productive for a week or so preceding and during the rut. It is at its best during cold or at least cool weather. It's not an end-all technique to be relied on constantly for all deer hunting situations, but rather a tactic that should be mixed in with others and employed when the precise circumstances dictate.

If you hunt on heavy-pressure areas, rather than scrape-watching, you might find watching escape routes is your best bet. I turn to this method on Opening Day and on weekends, in areas where lots of hunters are likely to be out and approaching deer from areas you can pinpoint, such as parking lots and pull-off areas along roads. Bucks will move away from these pressure points—and hightail it toward swamps, dense vegetation, thick bedding areas and steep terrain. Find out ahead of the season where these areas are and get into them well before sunrise on Opening Day and on weekends. You want to be waiting when other hunters filter in from parking areas and roads, literally

driving the deer to you. You may have to circle in to avoid spooking deer. But if you find these escape routes and bedding areas before Opening Day, your chance of seeing a nice buck is excellent.

And that brings up another tactic to work into your mix of hunting strategies—drives. Drives involve hunters walking through tracts of land with the intent of pushing deer toward a line of standers. This method is popular in many areas of eastern North Carolina and can produce well, but shouldn't be an exclusive method relied on all the time. When deer are traveling heavily during the rut or moving because of an approaching weather front, for instance, driving is clearly not the appropriate method.

On the other hand a drive might be the best way to produce action during midday, in warm weather, or when heavy hunting pressure has driven bucks into small, easily defined tracts of thick cover. The main thing is to pick times when the animals are concentrated in places small enough to be driven effectively. Most important, everyone should wear blaze orange and know exactly where his or her safe shooting lanes are before the drive is begun. Finally, be sure to place someone along potential side escape routes.

Calling deer is yet another popular strategy you can add to your hunting techniques. Snorting and bleating can be used effectively in some circumstances, but the two most important calls I like to employ are blowing a grunt tube and rattling antlers to simulate the sound of fighting bucks. Like the other strategies discussed, calling deer is not a tactic that should be used all day long or every place you hunt. Mixed occasionally with other strategies, though, it can pay in big dividends. Last year the two biggest deer I shot—a tall eight-pointer and a heavy 10-pointer—both came in to a grunt call. On other hunts, some of the largest bucks I've bagged have come in to rattling antlers.

The grunt is a communication method deer use as a casual-contact sound when tending does and also as an aggressive challenge to other bucks. Rattling antlers draws in bucks that are looking for a fight, searching for the doe the bucks are battling over, or that are simply curious about the intruders in their territory.

For rattling to be effective, the sex ratio needs to be about one buck to three does. If there are many more does than this, the bucks simply don't have any need to fight because females are readily available. Even if you're in a good area, rattling will usually work best the week before and the week after the peak of the rut, though it can work fairly well during the actual rut. Because bucks tend to move during cooler weather, the best times are early mornings and late afternoons. However, any time of day is good during heavy cloud cover or a light drizzle.

Grunting is effective in a broader area, even with an out-of-balance sex ratio. It can produce deer virtually any time of day (unless it's very hot), but the period around the rut is often best. As with any technique, you want to avoid overusing the call, so that deer don't associate it with hunting pressure. But mixed in with other strategies, grunting can be one of the key ingredients needed to harvest that wall-hanger you've always dreamed of. ⊠

For many hunters, *there is no greater thrill than beating a wary buck at his own game. By rattling antlers or using a grunt or bleat call, hunters can literally "talk" a romantic deer into a fatal attraction.*

Who flies at the witching time of night? Bats!

Night Flyers

written by Buffy Silverman
illustrated by Consie Powell

Bats live everywhere: in forests, in deserts, in fields and in jungles. They make their homes in every habitat on earth except in polar regions and on some islands. Yet few people see bats. Why? Because bats are ***nocturnal****. They take to the skies while we sleep.*

IN THE AIR

Most mammals walk, run, climb or swim. But not bats. As the only mammals with wings, bats fly. A bat's wings are made of thin skin stretched across long finger and hand bones. Powerful flight muscles and stiff joints in the wrists and elbows help a bat maneuver through the air. Because bats are incredibly light, their wings have little weight to lift.

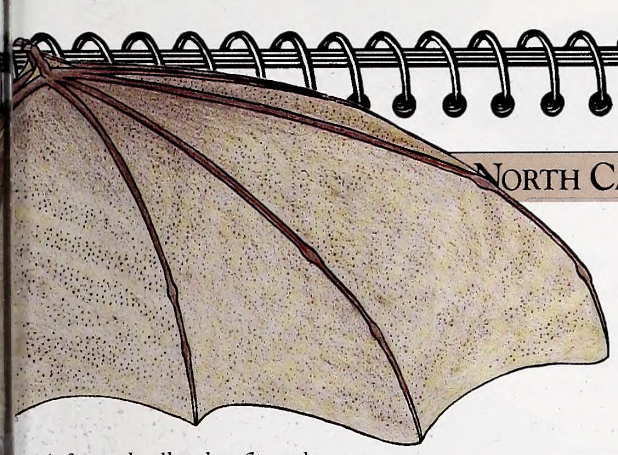
The ***Eastern pipistrelle****, one of the most common bats in North Carolina, is also the smallest, weighing only about as much as a nickel.*

ECHOLOCATION

Bats swoop through the air and capture flying insects in the dark of night. They zip through black caves, where hundreds of other bats fly, without crashing into each other. How do they find their way so well in darkness?

Most bats "see" the world with their ears. While flying, a bat makes clicking calls through its mouth or nose. These clicks are several octaves above the highest notes that people can hear. By listening to the echoes of its **ultrasonic** calls, a bat finds out what is in its flight path.

A bat flying in the open calls about 10 times per second. When it hears an echo, it increases its call rate to 100 times per second. Using **echolocation**, a bat learns the size, distance and location of trees, other bats and flying insects.



*A forest dweller that flies relatively slowly and can even hover, **Rafinesque's big-eared bat** is highly dependent on large trees in undisturbed woods for its roosting sites.*

Bats and Bugs

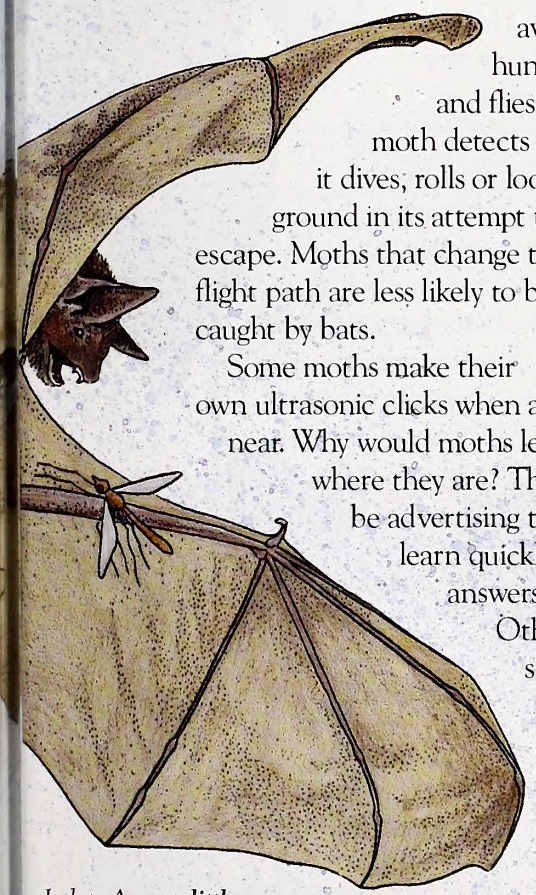
A bat traps insects in its tail and wings. It uses its sharp teeth to grab small insects off its wings and eat them while flying. Tiny insects are frequently caught directly in a bat's open mouth.

Can a bat catch any insect it hears? Usually, but not always. Certain moths listen for the clicks made by echolocating bats, and try to avoid being caught. If a moth hears a hunting bat that is 100 feet away, it turns and flies directly away from the bat. When a moth detects a bat that is close by, it dives, rolls or loops to the ground in its attempt to escape. Moths that change their flight path are less likely to be caught by bats.

Some moths make their own ultrasonic clicks when a bat is near. Why would moths let bats know where they are? These moths may be advertising their bad taste. Bats learn quickly that a meal that answers is likely to taste bad.

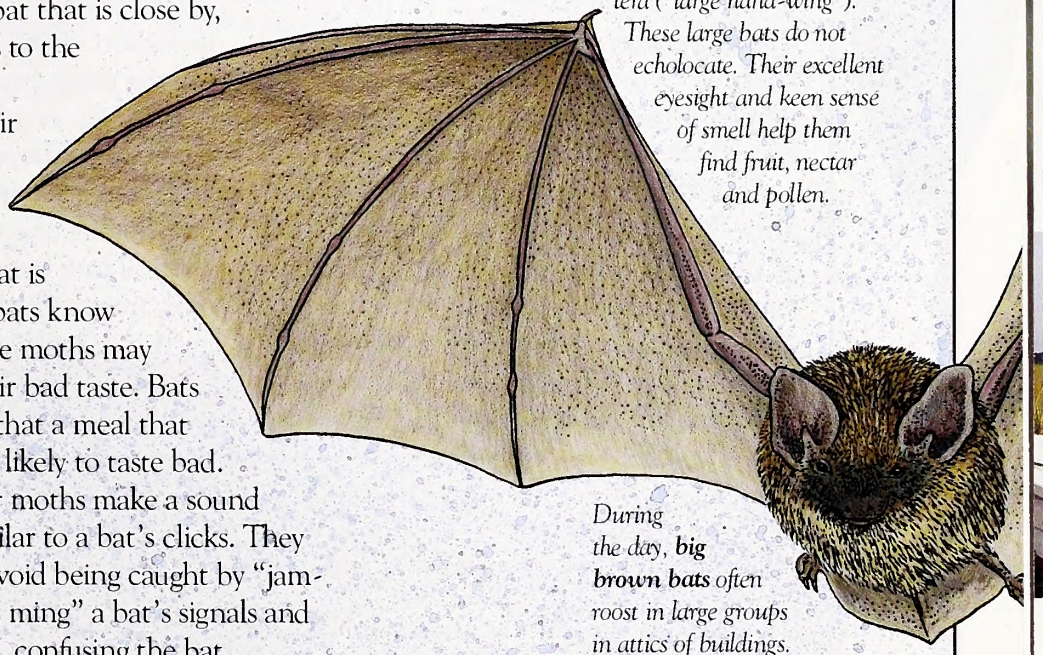
Other moths make a sound similar to a bat's clicks. They avoid being caught by "jamming" a bat's signals and confusing the bat.

Still, bats are very successful hunters. Every night a bat catches and eats one-quarter to one-half its weight in insects. That's like a 66-pound child eating 250 to 500 bowls of cereal in one day! A little brown bat can catch 600 insects in an hour.



*In late August, **little brown bats** migrate to caves where they will spend the winter. Some **migrate** more than 200 miles. They find a cool, humid place in a cave, and hibernate until spring.*

Most of the world's bats belong to a group called the Microchiroptera ("small hand-wing"). Although Microchiroptera can see with their small eyes, they use echolocation to find insects at night. Certain bats that live in tropical regions of Africa, Asia and Australia belong to a group called the Megachiroptera ("large hand-wing"). These large bats do not echolocate. Their excellent eyesight and keen sense of smell help them find fruit, nectar and pollen.



*During the day, **big brown bats** often roost in large groups in attics of buildings. Some smaller groups roost behind window shutters or in hollow trees. Big brown bats can live to be 18 years old.*

Red bat *babies are born in early June. Most bats give birth to one or two young. But a red bat mother may have three or four babies. The babies are born with their eyes closed and no fur. After three weeks of nursing, the young have grown enough to fly.*

BATS AND PEOPLE

People have long been superstitious about bats and often fear them. Bats fly through the air in darkness, while we humans need light to feel safe. Most fears that people have about bats are false.

Will bats get tangled in your hair? No. Using echolocation, bats can tell the difference between a moth-sized pebble and a moth. With that kind of navigational skill, they steer their way through darkness so expertly that they avoid people easily.

Do bats suck blood? The only bats that drink blood live far from us. Three species of vampire bats live in Central and South America. These bats look for cattle, horses, donkeys, pigs and other sleeping farm animals. A vampire bat makes a small scrape on an animal's skin and laps blood that oozes out. Vampire bats rarely attack people.

Do bats carry ***rabies****?* Yes, but it is very uncommon to find a bat with rabies. However, any wild animal that lets you get close to it may be sick. *Do not touch it.* If you find a bat that looks hurt or sick, leave it alone and call the public health department.

Bats help people and wildlife in many ways. They eat tons of mosquitoes and other insect pests. Some bats pollinate flowers when looking for nectar. Tropical fruit-eating bats swallow the seeds of fig trees and other fruit trees. The seeds in their droppings plant new rain forest trees. Bats play an essential role in the natural world.

What Does It Mean?

nocturnal: active at night

ultrasonic: sounds with frequencies above the range that can be heard by people

echolocation: a sensory system by which bats make high-pitched sounds and listen to the echoes to tell direction and distance of objects

rabies: an infectious viral disease that is transmitted by the bite of an infected animal

Chiroptera: the order of mammals that includes all bats, literally meaning hand-wing; the thin membrane stretched over long finger bones is a bat's wing

migrate: to move seasonally from one location to another

hibernate: to spend the winter in an inactive state, with a lowered body temperature and reduced metabolism. This enables an animal to survive on body fat when no food is available

roost: a place to rest or sleep

Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon.

Get Outside

Let them sleep: By autumn, many bats may be hibernating, and must be left alone. If disturbed a lot while hibernating, bats lose too much body fat and could die.

Want to watch bats?: Look for bats on a summer evening anywhere insects hang out. Street lights and porch lights attract insects, and that brings bats. Bats need water, so check for bats near ponds and streams. And bats need safe places to hide—trees, shrubs and rock piles all make good bat hideouts.

Build a bat house: You can help bats (and get rid of pesky backyard insects) by building a bat house. For information about bat houses, write to North American Bat House Research Project, PO Box 162603, Austin, Texas 78716 or call 1-800-538-BATS.

Visit the Museum: Come face to face with some creatures of the night and learn about the world that's awake when you're not. Meet the opossum, raccoon, catfish, moths and, of course, the bat. Saturdays in October, 11:30 a.m.-noon and 1:30-2:00 p.m. All programs are free. N.C. Museum of Natural Sciences, Raleigh. For more information, call (919) 733-7450.

It's WILD!

Project WILD activities for teachers and students that correlate to this topic include:

And the Wolf Wore Shoes: teaches students to discriminate between realistic and unrealistic portrayals of wildlife.

Here Today, Gone Tomorrow: teaches students to identify and describe causes for animal endangerment and extinction.

Let's Go Fly a Kite: teaches students that wildlife has value as artistic inspiration.

Which Niche?: teaches students about ecological niches of different animals.

Get WILD

Nov. 4-6—*North Carolina Science Teachers' Association Conference*, Greensboro. N.C. Wildlife Resources Commission Conservation Education specialists will conduct sessions on white-tailed deer, river otter, WILD-ABC Plan and the Pisgah Center for Wildlife Education in Brevard.

Feb. 26-27—*Salamanders: To Know Them Is to Save Them.* Advanced N.C. WILD workshop for educators. Donna Rogers. (919) 541-5478.

Silver-haired bats *spend their days under tree bark and in empty woodpecker holes. About an hour after sunset, they come out and hunt insects flying over ponds and streams.*

Read and Find Out

- *Bats* by Sylvia A. Johnson, Lerner Publications Co., 1985.
- *Bats: Mysterious Flyers of the Night* by Dee Stuart, Carolrhoda Books, Inc., 1994.
- *Batman: Exploring the World of Bats* by Laurence Pringle, Charles Scribner's Sons, 1991.
- *Mammals of the Carolinas, Virginia, and Maryland* by Wm. David Webster, James F. Parnell, and Walter C. Biggs Jr., University of North Carolina Press, 1985.
- *Shadows of Night: The Hidden World of the Little Brown Bat* by Barbara Bash, Sierra Club Books for Children, 1993.

In *Wildlife in North Carolina:*

- "Ears That See" by Lawrence S. Earley, March 1982.
- "Bats Aren't So Bad" by Doug Elliot, November 1990.
- "Blind As A Bat?" by Lawrence S. Earley, May 1993.
- "Bringing Up Baby, Upside Down" by Mary Kay Clark, July, 1998
- *Website for Bat Conservation International*: http://www.batcon.org Lots of wonderful information about bats, and links to other sites.

Horseshoe Lake Natural Area Is a Lucky Find for Conservationists

KEN TAYLOR

***Pristine wetlands** surrounding Horseshoe Lake will forever remain protected as a result of a cooperative effort between the N.C. Wildlife Resources Commission, environmentalists and a private landowner. From left to right are: Damon Tatem, eastern field representative for the Clean Water Management Trust Fund; Kathryn McCoy, Natural Heritage Trust Fund; J. Robert Gordon, district-four commissioner with the Wildlife Commission; Dohn Broadwell, private landowner; John E. Pechmann, Wildlife Commission vice chairman; and Katherine Skinner, executive director of the North Carolina chapter of The Nature Conservancy.*

Edited by
Rodney Foushee

KEN TAYLOR

A cooperative effort between the N.C. Wildlife Resources Commission, an environmental group and a private landowner has resulted in the permanent protection of more than 9,000 acres in Bladen and Cumberland counties.

The Horseshoe Lake Natural Area, an 8,000-acre tract also known as Suggs Mill Pond, was purchased by the Wildlife Commission from Canal Industries Inc. for $3.7 million. The Nature Conservancy assisted the state with the acquisition of the property.

Located near Fayetteville, the tract will be managed as the Bladen County Game Land and will be open to the public for hiking, fishing, boating, birding and special permit hunting.

"Horseshoe Lake is a valuable addition to our game lands program," said Wib Owen, section manager for the Wildlife Resources Commission's Division of Wildlife Management. "Placing this land in public ownership will not only benefit wildlife, it will also benefit all North Carolinians who enjoy the outdoors."

In addition, private landowner Dohn Broadwell purchased an adjacent 1,915 acres from Canal Industries. Broadwell plans to donate a series of conservation easements to The Nature Conservancy that will prohibit development on his property. By donating the easements, Broadwell hopes to restore his property's longleaf pine communities to their original condition.

The Horseshoe Lake area contains a medley of unique natural communities, including large and small peat-filled Carolina bays. The lake is also located near other ecologically significant state-owned properties that include Jones Lake State Park, Bushy Lake State Natural Area, and Bladen Lakes State Forest. These natural areas comprise a vast expanse of unique natural communities considered nationally significant by the N.C. Natural Heritage Program.

Horseshoe Lake is a partially water-filled Carolina bay that is dominated by floating mats of vegetation, including thousands of yellow pitcher plants. The lands surrounding the horseshoe-shaped lake contain other rare natural communities such as pocosin, Atlantic white cedar forest and pond pine woodland. The rims of the Carolina bay are characterized by pine flat woods and Sandhills scrub communities.

The purchase of the 8,000 acres was funded by a $2.25 million grant from the Clean Water Management Trust Fund and two grants totaling $1.5 million from the Natural Heritage Trust Fund. The Clean Water Trust Fund was established in 1996 to help finance projects that specifically address water pollution problems, including creating networks of riparian buffers.

—Courtesy of The Nature Conservancy

Invest in Lifetime Licenses

Take a close look at the expiration date on your hunting or fishing license. If the date is drawing near, now is the perfect time to invest in a lifetime license and help wildlife.

Proceeds from the sale of lifetime hunting and fishing licenses are placed in the North Carolina Wildlife Endowment Fund where only the fund's interest is spent on wildlife projects. As the fund's principal grows, it plays an increasingly important role in supporting wildlife conservation in North Carolina.

Lifetime licenses are not only good for wildlife, they are also good investments for hunters and anglers. At current license rates, it would take just over 12 years to break even on the cost of a lifetime sportsman's license. As an additional bonus, lifetime licenses remain valid in North Carolina even if the license holder moves to another state. The same holds true for lifetime licenses purchased for youths under 12 and infants.

Several lifetime licenses are available, including lifetime sportsman's licenses for residents, nonresidents, youths and infants under one-year-old. These licenses include all hunting and freshwater fishing privileges statewide except for the federal waterfowl stamp. Separate lifetime hunting and fishing licenses are available for residents only. And a special lifetime subscription to *Wildlife in North Carolina* magazine is also available for $100.

To apply for a lifetime license or magazine subscription, use the form at the back of this magazine.

Field Notes

Eastern Gun Deer	Opens Oct. 12
Eastern Bow and Arrow Deer	Closes Oct. 3
Central Bow and Arrow Deer	Through Nov. 7
Northwestern Bow and Arrow Deer	Through Nov. 14
Western Bow and Arrow Deer	Closes Oct. 3; Re-opens Oct. 12
Eastern Muzzleloading Deer	Oct. 5-10
Western Muzzleloading Deer	Oct. 5-10
Black Bear	See *Regulations Digest*
Wild Boar	Opens Oct. 12
Gray Squirrel	Opens Oct. 12
Fox Squirrel	See *Regulations Digest*
Fox	See *Regulations Digest*
Raccoon and Opossum	See *Regulations Digest*
Ruffed Grouse	Opens Oct. 12
Mourning Doves (first season)	Closes Oct. 10
Rails, Gallinules and Moorhens	Through Nov. 13
Crow	See *Regulations Digest*
Bobcat	See *Regulations Digest*

Migratory waterfowl regulations unavailable at presstime. For waterfowl seasons and limits, call 1-800-675-0263 after Labor Day. Information on bag limits, either-sex deer seasons and other regulations may be found in the *1998-99 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission.

The 1999 North Carolina Wildlife Calendar Is Here!

Duane Raver's "Down East Canadas" is one of 12 fine paintings featured in the 1999 North Carolina Wildlife Calendar. Order now before they're sold out.

The works of Mark P. Slawson, James A. Brooks, Robert B. Dance, Dempsey Essick, Duane Raver, Raney G. Rogers, David Williams, Robert C. Flowers Jr., Brian Edwards and Joe Seme are featured in the 1999 North Carolina Wildlife Calendar.

Order yours today! Payment must accompany your order. Calendar orders may be charged to VISA or MasterCard, or enclose your check or money order (payable to NCWRC). Complete the form below and mail with payment to:

1998 Calendar, N.C. Wildlife Resources Commission
512 N. Salisbury Street, Raleigh, N.C. 27604-1188
(Office is located at 322 Chapanoke Road in Raleigh.)

GREAT CHRISTMAS GIFT!

Please send me _____ Calendars at $6.00 each . . . . . .$_____

All N.C. residents add $.36 sales tax per calendar . . . . . _____

☐ Enclosed is my check for **total** payment of . . . . . .$_____

☐ Charge to MasterCard or VISA for the calendar(s) ordered above. My card number is _____ and the expiration date is _____/_____.

_____ (_____)_____
Card holder signature | Day Time Phone No.

If ordering 7 or more calendars, please provide your UPS deliverable address.

Name _____

Address _____

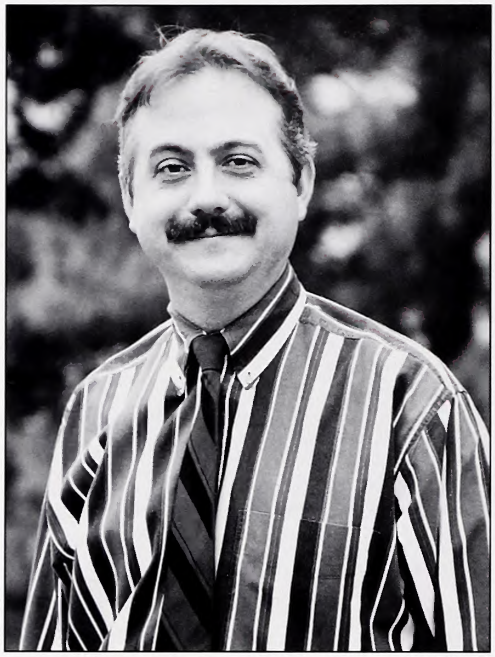
City/State/Zip _____

Phone (_____) _____

All orders must be prepaid. A $20 charge will be made on returned checks (N.C.G.S. 25-3-512). **For fund raising and bulk rate information (10 calendars or more), call 919-662-4377. Please allow 6 weeks for delivery.**

CAL099

North Carolina Native Returns to Fill Head Wildlife Management Position



MELISSA McGAW

***David Cobb, former** assistant chief for the Bureau of Wildlife Conservation with the Florida Game and Fresh Water Fish Commission, has been named the new chief of the Division of Wildlife Management for the N.C. Wildlife Resources Commission. A native of Guilford County, Cobb is looking forward to promoting wildlife conservation in his home state.*

After more than eight years with the Florida Game and Fresh Water Fish Commission, a native North Carolinian has returned to fill one of the N.C. Wildlife Resources Commission's top wildlife management slots.

David Cobb, a native of Guilford County, left Tallahassee, Fla., this summer to begin service as the chief of the Division of Wildlife Management. Cobb succeeds former Wildlife Management Chief Hal S. Atkinson Jr., who retired in April after serving 30 years.

"Professionally, it is a unique opportunity to have an impact on the wildlife resource in my home state," Cobb said.

His decision to accept the position was largely influenced by the Wildlife Management Division's reputation for effectiveness. Citing the game lands program, Cobb said he was particularly impressed with the substantial amount of acreage the commission has acquired for public hunting in North Carolina. In addition, Cobb said he was also swayed by the commission's successful big game, small game and nongame projects. "There are a lot of programs that are well established and expanding, and they should be continued," he said.

As Wildlife Management chief, Cobb will be responsible for overseeing three management sections: Nongame and Endangered Species, Land Management and Budget, and Surveys and Regulations. "My responsibility is to provide direction for those sections and make sure they have the opportunity and resources to do their jobs," he said.

And while he believes the Wildlife Management Division, as a whole, is strong, Cobb said there is still room for some adjustment. One of his first orders of business will be to perform a division-wide evaluation. "One of the things I want to do is to try and get the division in a more pro-active conservation mode," he said. "We want to identify some short- and long-term goals for different programs and have those elements working toward those objectives."

Cobb received his bachelor's degree in wildlife biology from N.C. State University in 1983, his master's degree in biology applied ecology from Eastern Kentucky University in 1985 and his doctorate in zoology from N.C. State in 1990.

An avid turkey hunter, Cobb earned his doctorate while studying the impact of unnatural flooding on wild turkey populations along the Roanoke River. At N.C. State, he was a teaching assistant for two years, research assistant for two and a half years and acting wildlife extension specialist for six months.

—Chris Powell

Wildlife In North Carolina Takes Top Magazine Award

For the third time in five years, *Wildlife in North Carolina* magazine has claimed the Association for Conservation Information's first place national award for best magazine.

The awards were announced at the ACI's annual summer meeting held this year in Austin, Texas. ACI is an international organization made up of state, federal and provincial wildlife and natural resources agencies and other national wildlife conservation groups.

In addition, the North Carolina Wildlife Calendar won first place in the calendar category; and the book—Nature's Ways: Natural History Essays from *Wildlife in North Carolina*—won first place in one- to three-color publications category. Finally, "Southern to the Core," an article written by former magazine staff member Ted Dossett, won second place in the general interest category.

Larry Earley, editor of *Wildlife in North Carolina*, attributed the magazine's award to a recent redesign of the publication that included the addition of North Carolina WILD Notebook, an educational section designed for younger readers. "I think that the addition of new staff and some innovative changes to the magazine have made *Wildlife in North Carolina* an effective educational tool that will continue for years to come," Earley said.

Adding to that, Sidney Baynes, chief of the Wildlife Commission's Division of Conservation Education, said the recognition is a reflection of the hard work and dedication demonstrated by the entire division staff. "What's even more rewarding than these awards is the positive response to our programs that we continue to receive from the public," Baynes said. "The support provided by the Wildlife Commission and the director's office and the hard work and dedication of the division staff are keeping the agency in a position of national leadership in the field of environmental education."

—Chris Powell

Endangered Mountain Sweet Pitcher Plant Reintroduced into Wild

One of the Carolina's rarest plant species was reintroduced into the wild this summer through a joint effort among the N.C. Department of Agriculture and Consumer Services, the Atlanta Botanical Garden and the U.S. Fish and Wildlife Service.

The mountain sweet pitcher plant can be found at only 10 sites in the country, four in North Carolina and six in South Carolina. Successful reestablishment at two mountain bogs in Henderson County in June brings the North Carolina population up to six sites.

The pitcher plant, one of 26 North Carolina plants on the verge of extinction, is carnivorous, capturing insects and digesting them in its tall, yellow-green pitchers. The plants produce bright red flowers in the spring.

"In this ever-changing world, it is essential we preserve the heritage of the native plant life in our state," said Agriculture Commissioner Jim Graham.

Known to inhabit *only four sites in North Carolina, the mountain sweet pitcher plant has been reintroduced to two mountain bogs in Henderson County.*

The Atlanta Botanical Garden cultivated the 50 plants that were reintroduced June 24 in Henderson County as part of an expanding conservation program. Teachers and environmental educators participating in a Wildlife Commission advanced Project WILD workshop on endangered species helped relocate the plants. The teachers cleared underbrush, transplanted the pitcher plants and mapped their locations for future work.

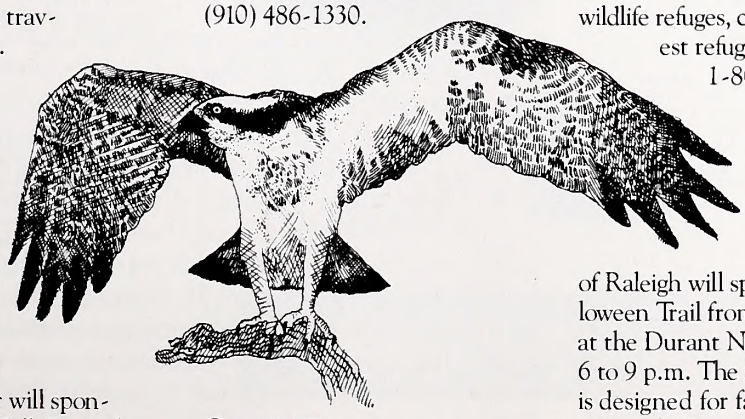
The pitcher plant is the second endangered wetland plant species to be reintroduced in North Carolina.

—Courtesy of the N.C. Department of Agriculture and Consumer Services

KEN TAYLOR

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.



Oct. 10 -11

The Museum of the Cape Fear will sponsor a Cape Fear Folk Festival from 10 a.m. to 5 p.m. at the Cape Fear Historical Complex. The free event features 18th- and 19th-century skills, crafts and customs as well as folk music provided by North Carolina musicians. For more information, call Leisa M. Brown at (910) 486-1330.

Oct. 11-17

National Wildlife Refuge Week will be celebrated across the country. Nature walks, birding tours, special hunts and environmental education programs are planned. For more information about events scheduled at North Carolina's 11 national wildlife refuges, contact the nearest refuge office or call 1-800-344-WILD. Web address: http://refuges.fws.gov/

Oct. 23-24

The City of Raleigh will sponsor a Halloween Trail from 6 to 9 p.m. at the Durant Nature Park from 6 to 9 p.m. The non-scary event is designed for families with young children, and features a guided tour through the park with educational stops along the way. For more information call (919) 831-6856.

Oct. 30-31

The Alligator River National Wildlife Refuge will sponsor the 1998 Red Wolf Howling Safari at 7 p.m. at the Alligator River Refuge. The safari will begin at the Creef Cut Wildlife Trail, located 20 minutes from Manteo on Highway 64 between East Lake and Manns Harbor in the Alligator River Refuge. Participants will learn about red wolves and can participate in an actual "howling." For more information, call Michael Moore at (252) 473-2557.

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through July 1998

Principal Balance
$26,073,597.56

Interest Earned
$25,938,088.72

Total Receipts
$52,011,686.28

Interest Used
$15,250,446.04

Fund Balance
$36,761,240.24

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Fall Flooding and Stocking

by Rodney Foushee

With the dog days of summer behind us, there are still aquatic chores that need tending to ensure plenty of fish and wildlife on your land in the coming seasons.

Flooding for Ducks: Though teal and pintails have already begun to arrive in North Carolina, October is a fine month to begin flooding waterfowl impoundments in preparation for the long duck hunting season that begins next month.

Black ducks, mallards, ringnecks, gadwalls and widgeon will all be making their appearances in the coming months. Gradual flooding of mature Japanese millet will provide excellent food and cover for these waterfowl species and other wildlife over a longer period than rapid flooding. Best results are reached when 15 to 25 percent of the impoundment is covered with less than a foot of water.

If you have several impoundments, stagger the flooding through December to provide different species with adequate food and cover through the hunting season and into spring. Late-flooded impoundments will hold food for ducks until early spring, sending them back to their northern breeding grounds in top condition.

Stocking Ponds: October through November is the right time to stock sunfish and catfish in a new or reclaimed pond. Bluegills, shellcrackers and channel catfish are all good choices for farm ponds. Crappies, bullheads and other sunfish species, on the other hand, should be avoided because they can easily overpopulate a small pond.

Largemouth bass are fine, but don't add any until next June. This gives the sunfish time to grow over the winter and start spawning next spring before the bass can eat them all.

Stock ponds at a ratio of 10 sunfish fingerlings for each bass to achieve a balanced fish population. You can also add 50 to 100 channel catfish fingerlings per acre if you like. Although their growth rates vary, it usually takes about three years for bass and sunfish fingerlings to reach a harvestable size in a well-managed pond. For quicker results, you can stock adult fish at a ratio of five sunfish for each bass. However, this option is usually more expensive. For more information about pond management, call the Wildlife Commission's Division of Inland Fisheries at (919) 733-3633.

N.C. WILD STORE

NEW!

Introducing the first poster in our "Sporting Heritage" series...

WATERFOWL DECOYS OF NORTH CAROLINA

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting are collected for the first time. This heavy-stock, framable poster is destined to become a collector's item. From private collections throughout the state, the artistic hand-carved decoys brilliantly evoke the days when waterfowl blackened the skies over eastern North Carolina. $10.

ITEM CODE **P12**

★★★★★★★★★★★

Other new items shown on page 38:

*Check out the latest in our colorful and informative nature posters—"**Frogs of North Carolina.**"*

Add to your wardrobe with two new styles of **Wildlife in North Carolina** *caps—choose from camouflage and blaze orange.*

North Carolina's Heritage SPORTING

WATERFOWL DECOYS of NORTH CAROLINA

In the legendary days of waterfowl hunting, the ducks, geese and swans migrated by the hundreds of thousands into Currituck Sound, Pamlico Sound, Lake Mattamuskeet, Core Sound and other large waters of eastern North Carolina. In these isolated areas, an illustrious group of decoy carvers arose, their common bond a love of waterfowling and its heritage. In the first poster of the "Sporting Heritage" series, *Wildlife in North Carolina* magazine presents 19 of the state's most famous decoys.

Editor: Neal Conley
Photography: Melissa McGee
Designed and published by Division of Conservation Education, N.C. Wildlife Resources Commission

PRESERVING OUR SPORTING TRADITIONS

More terrific items ☛

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

White, 100% cotton (preshrunk) T-shirts are guaranteed for comfort and durability. Each shirt features an original design.

N.C. WILD T-SHIRT
N.C. WILD logo printed on front and colorful art on back. $14.50.
ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE IN N.C. T-SHIRT
WINC magazine logo on front pocket. Tundra swan art on back. $14.50.
ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD CAP
N.C. WILD logo is embroidered on a pro-shape, brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. $16.50.
ITEM CODE A1

WILDLIFE IN N.C. CAP
Brook trout and magazine logo are embroidered on a sage-colored, premium weight, pigment-dyed, brushed cotton cap with an unstructured front, an extended bill, and a nubuck suede closure. $16.50. ITEM CODE A3

WILDLIFE IN N.C. CAPS
Each embroidered with magazine logo and buck deer silhouette. Described left to right. $16.50 each.
Blaze orange with brown waxcloth bill. ITEM CODE A7
Advantage® Camouflage with tan suede bill. ITEM CODE A6
While supplies last! Stone with navy canvas bill. ITEM CODE A2

FROGS OF N.C. (THE HYLIDS)
Presents all 15 of the state's tree frogs, cricket frogs and chorus frogs. 22" x 34". $6. ITEM CODE P11

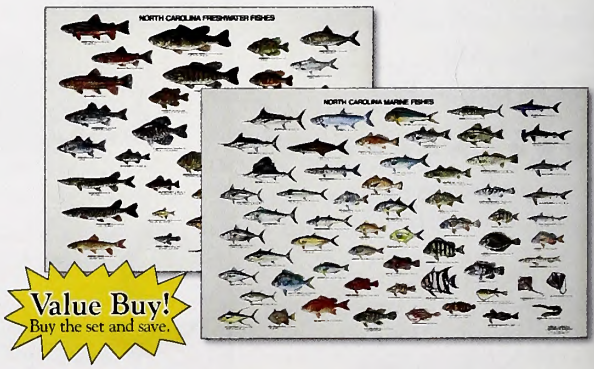
LIZARDS OF N.C.
12 of the state's lizard species. 22" x 34". $6. ITEM CODE P3

TURTLES OF N.C.
21 of the state's turtle species. 22" x 34". $6. ITEM CODE P4

SNAKES OF N.C. (LIVEBEARERS)
17 of the state's snake species. 22" x 34". $6. ITEM CODE P5

SNAKES OF N.C. (EGGLAYERS)
19 of the state's snake species. 22" x 34". $6. ITEM CODE P8

SET OF 4 POSTERS
Save $6 by purchasing the set of four posters (P3-P8). $18.
ITEM CODE P10



N.C. FRESHWATER FISHES
Find your favorite fish with this color poster showing 36 of the state's freshwater fishes. 28" x 22½". $6. ITEM CODE P6

N.C. MARINE FISHES
All the colors of the sea can be found on this poster of 60 marine fishes. 35" x 22½". $6. ITEM CODE P7

N.C. FRESHWATER AND MARINE FISHES
Save $2 when you buy both posters as a set. $10. ITEM CODE P9

Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50. ITEM CODE **M9**

Also available as a boxed set. $30. ITEM CODE **M10**

North Carolina WILD Places Map

Artist's Proof. $40. ITEM CODE **E2**
Limited Edition. $25. ITEM CODE **E3**
Poster. $6. ITEM CODE **E4**

Dogs that Point, Fish that Bite

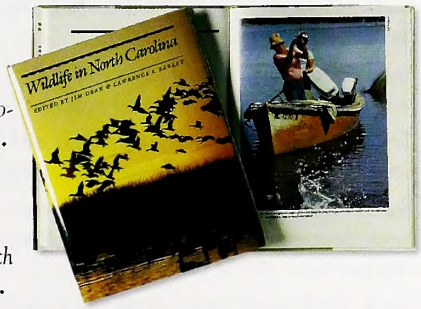
Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission. Hardbound. 220 pages. $19.95.
ITEM CODE **M8**

North Carolina WILD Places Posters

(Set of 3): Posters of "Old Field" and "Mountain Cove Forest" from *North Carolina WILD Places: A Closer Look*. 19 1/2" x 16". Shipped folded with poster version of WILD Places Map. $8. ITEM CODE **E5**

Wildlife in North Carolina Book

The best of *Wildlife in North Carolina* magazine. Hardbound. $12.
ITEM CODE **M3**



Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. $10.
ITEM CODE **M2**

WILD Places book and posters

Buy the *North Carolina WILD Places* book and all three posters and save! (Items E1 and E5) $16.
ITEM CODE **E6**

Value Buy! Buy the set and save.

Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.
ITEM CODE **M6**

North Carolina WILD Places: A Closer Look

Easy-to-read text and Anne Marshall Runyon's delightful illustrations make wildlife habitats come alive in this 82-page book. Discusses 13 habitats across the state. $10. ITEM CODE **E1**

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
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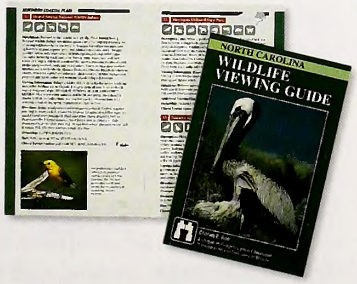

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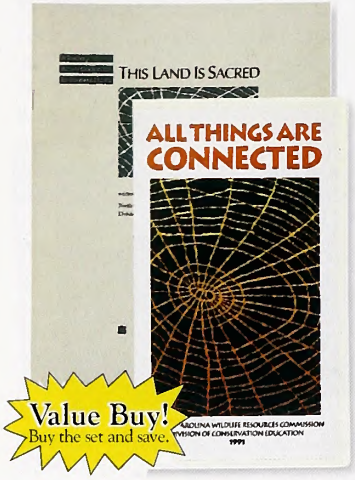

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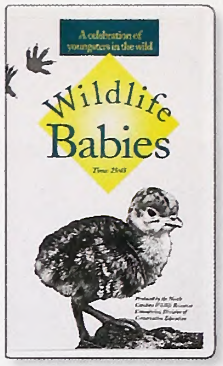

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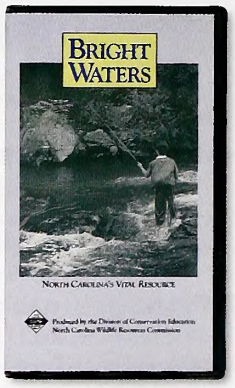

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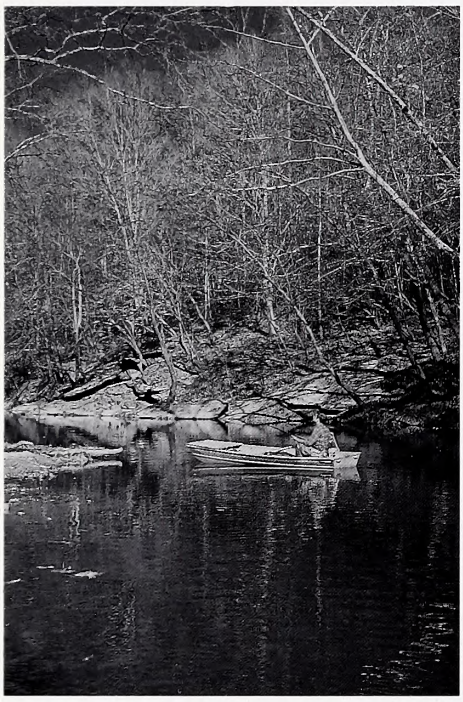

JIM DEAN

"Are there big bass or only watery ghosts in those caves now?"

Back before the Falls Lake dam was built, flooding the upper Neuse to provide water for the growing state capital and Triangle, the river was as nearly wild as any in the Piedmont. You could drift for miles without seeing any sign of habitation. One brilliant November blue-sky day in 1974, after we had learned of plans to dam the river, Mike Gaddis and I loaded our gear into a 12-foot johnboat below the N.C. 50 bridge north of Raleigh and pushed off to pay our last respects.

The river stretched before us, a winding, dark artery broken by occasional chuckling riffles. Lofty sycamores leaned out over the remarkably clear pools forming a corridor of stark, white columns that were reflected in the water amidst lingering smears of yellow, red and rust from the hardwoods.

Mike's plan was to drift and hunt squirrels as he had often done here in the past, but I had been unable to resist the notion that bass and panfish would surely be active in such Indian summer weather, so I had arrived with both a shotgun and a spinning rod.

"You're just going to scare off the squirrels, flailing the water with that thing," Mike said. It was a futile, good-natured objection. We long ago recognized that our sporting preferences aren't entirely identical, and while we tease each other from time to time, we have come to the tolerant understanding that all hunting and fishing is good when it happens in magical places.

Two hundred yards downstream—just opposite the spot where public boat ramps and a huge parking lot would soon be built on the new lake—we came to a sharp bend.

"Look there," pointed Mike. "That hillside is covered with native laurel. Not many people realize how prevalent it is this far from the mountains, yet it is common along many Piedmont rivers. Wish you had seen it in bloom."

The first gray squirrel was sitting on a stump at eye level just beyond the bend, seemingly unconcerned by our passage.

"It has always amazed me that squirrels are seldom spooked by a boat," whispered Mike. "Sometimes, if you're quiet, you can drift within a few yards, but if you so much as put one boot on the bank, they skedaddle." Since that target provided no challenge, Mike showed him a foot and took his shot as the squirrel raced through the treetops.

Between bushytails, I paddled and made casts with a small spinner across the dark pools. Robin and small bass struck on nearly every cast, and even Mike was impressed. Swapping paddling chores occasionally, we continued to drift southeast towards our takeout spot at the N.C. 98 bridge.

About halfway through our passage, we came to an even more handsome stretch of river where sandy bars and huge rocks diverted the river through its meandering course. Tall rock cliffs soared over us on the left, and we pulled the boat up on a sandbar to have a look. "This is called Zeagle's Rock," Mike said. "There are caves here, and I have often thought that Native Americans must have had a special affection for this spot for thousands of years. Good shelter, good swimming, good hunting. . . ."

"And good fishing," I said.

"That, too," Mike allowed.

Late in the afternoon with the shadows growing longer and several squirrels in Mike's game bag, we put aside our guns and fishing gear and slowly paddled the final mile or so in silence. When the bridge came in sight, Mike turned the canoe so that we could take a last look upstream while we drifted the final few hundred yards. I knew what he was thinking—I won't ever do this again, won't ever see this again. Nor, very soon, will anyone else, and most people will never know what has been lost.

In recent years, Mike and I have spent a fair amount of time fishing Falls Lake from Mike's bass boat. It's a big, comfortable boat with a 175-horsepower Mercury, trolling motor, pedestal seats fore and aft, and even a fancy marine AM-FM so we can listen to music while we fish.

And sometimes we drift past the exposed top of Zeagle's Rock, working soft plastic salamanders or pig 'n jigs down the steep sides into...what? Are there big bass or only watery ghosts in those caves now?

A couple of years ago, not far from this spot, Mike caught a largemouth that weighed over 11 pounds. He was very happy about that, but I wonder if he wouldn't swap both boat and bass for the river we saw that day nearly 25 years ago.

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KEN TAYLOR

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CONTENTS

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

November 1998 *Volume 62, Number 11*

FEATURES

4 **A Passion for Quail**
written and photographed by Joel Arrington ©1998
When the Stephensons hunt quail, they don't mess around. They own good dogs and good guns and they're crack shots. Oh, and they hunt 50 days a year.

page 4

8 **Twilight for Oysters** *written by Rodney Foushee*
photographed by Melissa McGaw
North Carolina's oyster stocks, declining for a century, have plummeted in recent decades, threatening the oystermen's livelihoods and the health of our estuaries.

14 **The World Is Full of Moths**
written and photographed by Harry Ellis ©1998
If God loved butterflies, perhaps He loved moths more. The night-flying moths outnumber the sun-loving butterflies by more than 10 to one.

page 14

18 **Our Biggest Duck Club** *written by Chris Powell*
Even if you don't have the cash to join a private waterfowl club, membership in the state's biggest club—the Wildlife Commission's 26 waterfowl impoundments—comes with the cost of your hunting license.

page 8

22 **Forestry for the New Millennium**
written by Lawrence S. Earley
In 1898, the opening of the Biltmore Forest School led the nation into the era of managed forests. A century later, new ideas are already shaping a new forestry for the 21st century.

DEPARTMENTS

Our Natural Heritage *by Jim Dean* ©1998 ..... **inside cover**
Nature's Ways *by Mary Kay Clark* ©1998 2
N.C. WILD Notebook *by Consie Powell* ©1998 28
Back Porch *by Chris Powell* 32
Wildlife Through the Year *by Rodney Foushee* 36

page 28

Cover *Autumn's last glow provides a colorful backdrop to the antics of this hungry gray squirrel. Photograph by Jack Dermid.* ©1998

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The Penthouse Mouse

written by Mary Kay Clark ©1998
illustrated by David Williams

Would it surprise you to learn that one of our most beautiful native mammals is a mouse? The golden mouse is one of eight native mouse species in North Carolina. The soft, sleek, rich golden-brown fur for which it is named covers the 7-inch mammal from its head to its rump. Its belly and underparts are a creamy white. When compared to the gray-brown coats of most of our mouse species, the golden mouse's coat is outstanding.

This attractive little rodent just might be your neighbor. The species is common in the state but not often seen. And you won't find it trying to live in your house like the introduced house mouse or the ubiquitous native white-footed mouse. In winter the golden mouse may go underground, but in warmer months it prefers a nest above the ground—a penthouse, if you will. That is pretty unusual behavior for a mouse. Most mice build nests on the ground in or near fallen logs or among other sheltered spaces.

Although a golden mouse will occasionally remodel an old bird's nest, it usually makes its own nest. Nests are of two types—one for shelter and raising young, and another for feeding. These nests differ somewhat in shape, but both are generally oval or globular, usually about 6 inches in diameter. Nests as large as 12 inches in diameter have been found.

Nests used for raising young are woven of grasses, fibers, pine needles and small leaves, and they are carpeted with soft materials such as thistledown, rabbit hair and feathers. Both types of nests are often placed in a tangle of vines, among shrubs, in the crown of a fallen tree, in a crotch between two branches or even in Spanish moss. Nests may be placed only a foot or so above ground or as high as 15 feet or more above ground. They sometimes also build loosely constructed platforms that serve as places to rest and feed.

Golden mice carry large quantities of seeds to the feeding shelters where they open and eat them. The mice eat a variety of seeds including sumac, wild cherry, dogwood, greenbrier, poison ivy and blackberry. Invertebrates (mostly insects) make up about half of their diet. They are nocturnal and gather food both on the ground and in the trees and vines in which they live, collecting food in cheek pouches until they return to the nest or feeding platform.

Golden mice do spend a good deal of time on the ground so they are best described as semi-arboreal. But they are great climbers and have been known to climb to heights of 30 feet or more. They move among tree limbs with great agility, using the tail to help them balance. The tail is a prehensile organ as well, and is used for grasping twigs and branches. They've occasionally been observed hanging upside down by their tails, like monkeys.

Golden mice don't get to enjoy their penthouse life for long. The average life span of a golden mouse has been estimated at 6½ months; the record longevity is a little more than 2½ years.

These mice are quite sociable except when females give birth, which they do three times a year, producing two to five young each time. Golden mice are active all year and they reproduce throughout the year, although there is more reproduction in the fall than in the winter. The large nests are sometimes used as "communes" where six or more mice may live together. One investigator found a nest containing eight mice, all males, living in a bachelor colony.

Wherever the habitat occurs, it must contain good ground cover and an abundance of underbrush or masses of vines. The density of golden mice in a given area is directly related to the density of groundcover, particularly the amount of underbrush and vine entanglements. So when clearing your property, consider leaving some honeysuckle, greenbrier and wild grapevines for your little golden neighbor. The little rodent with the lovely coat will appreciate it.

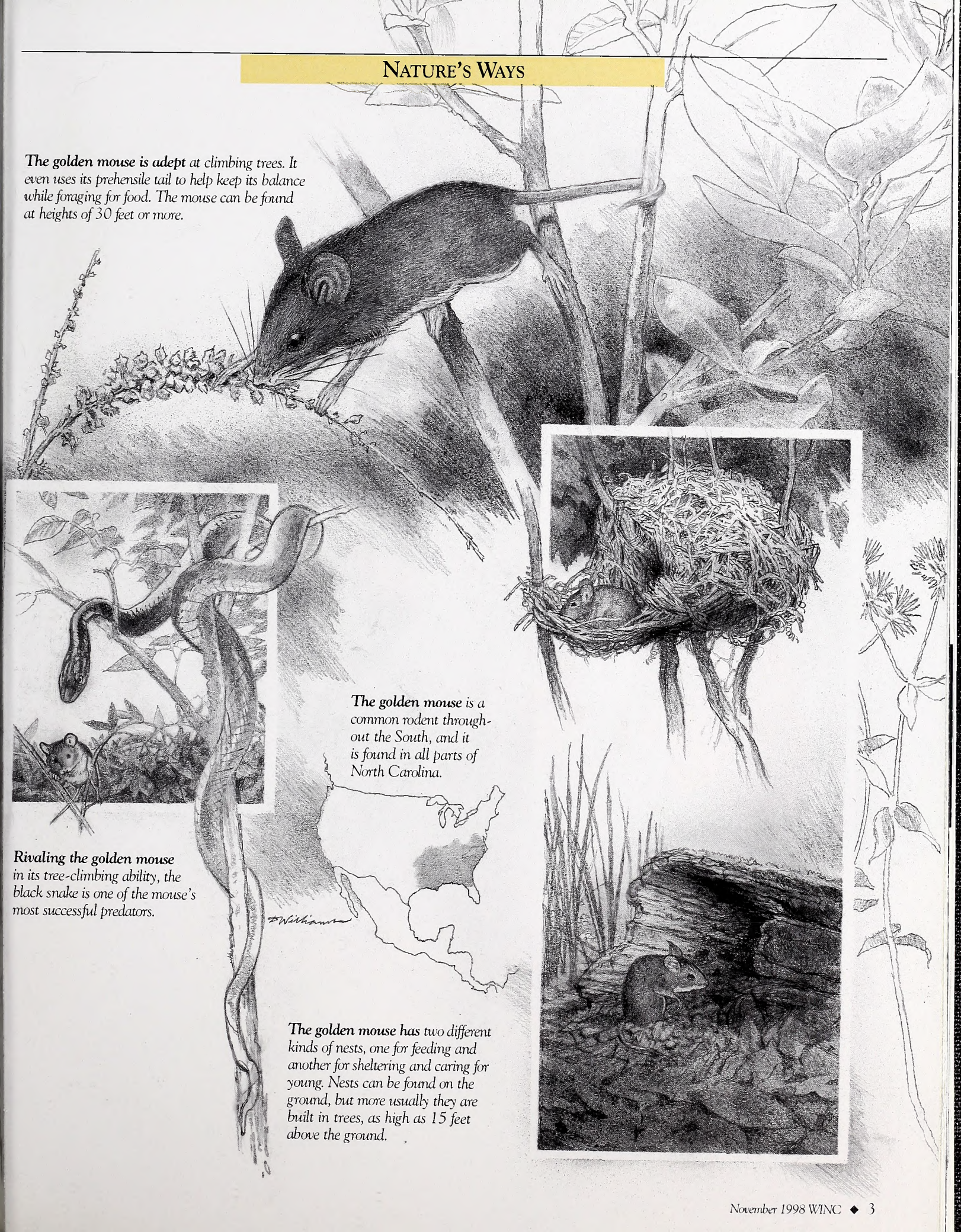
Mary Kay Clark is a curator of mammals at the N.C. Museum of Natural Sciences.

Other Reading

- Andreas Fischer-Nagel, *A Look Through the Mouse Hole* (Carolrhoda Books, 1989).
- David Webster et al., *Mammals of the Carolinas, Virginia and Maryland* (University of North Carolina Press, 1985).
- John O. Whitaker Jr., *National Audubon Society Field Guide to North American Mammals* (Alfred A. Knopf, 1996).

Surfing the Web

- For information on the golden mouse, see the *Peromyscus* database at the University of South Carolina. *Address:* http://stkctr.biol.sc.edu/p_nuttal.htm
- For more information and a good photograph of the golden mouse, see *The Mammals of Texas*—Online Edition. *Address:* http://www.nsrl.ttu.edu/tmot/ochrnutt.htm



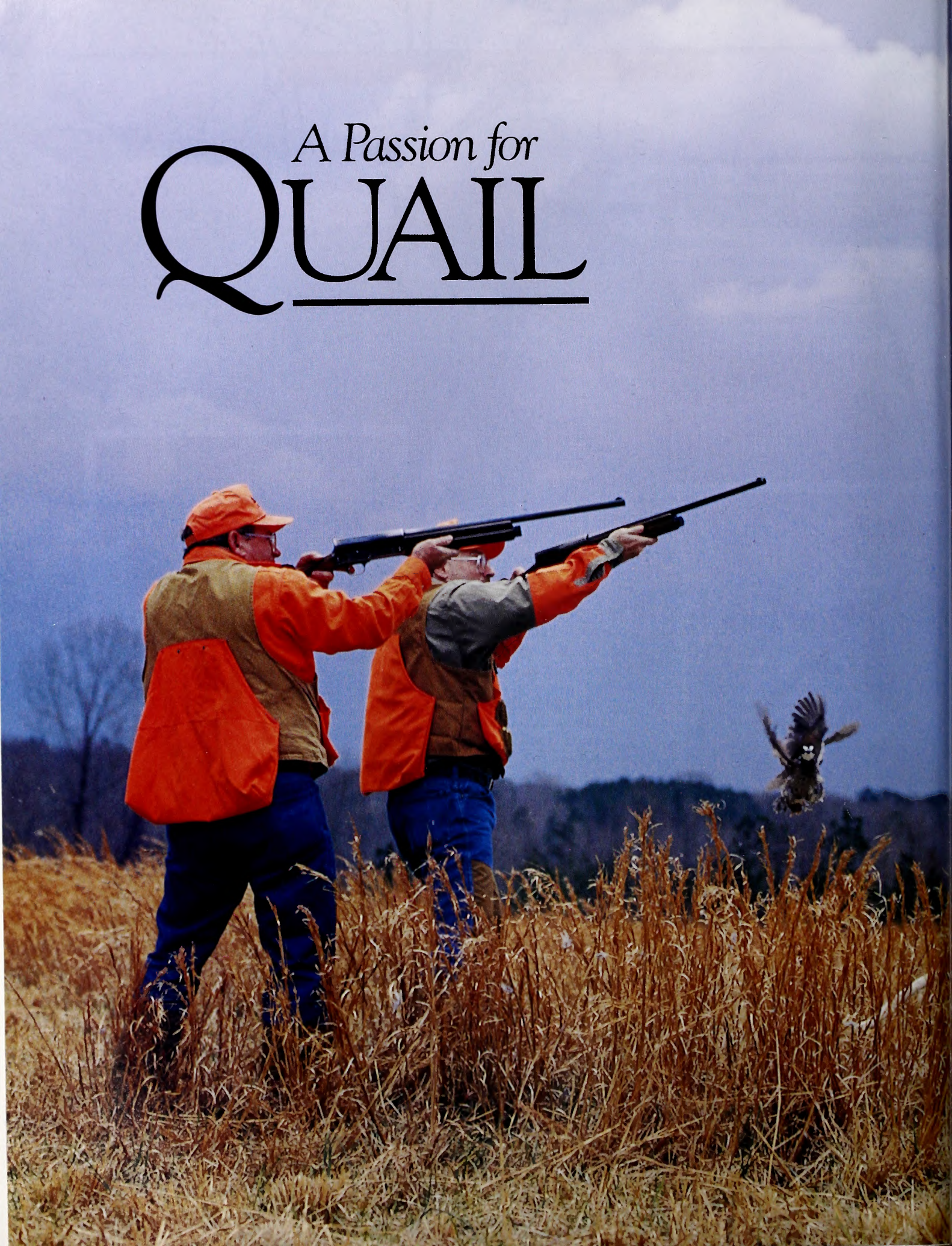
The golden mouse is adept *at climbing trees. It even uses its prehensile tail to help keep its balance while foraging for food. The mouse can be found at heights of 30 feet or more.*

Rivaling the golden mouse *in its tree-climbing ability, the black snake is one of the mouse's most successful predators.*

The golden mouse *is a common rodent throughout the South, and it is found in all parts of North Carolina.*

The golden mouse has *two different kinds of nests, one for feeding and another for sheltering and caring for young. Nests can be found on the ground, but more usually they are built in trees, as high as 15 feet above the ground.*

A Passion for QUAIL



When the Stephensons hunt quail, they don't mess around. They own good dogs and good guns and they're crack shots. Oh, and they hunt 50 days a year.

written and photographed by
Joel Arrington ©1998

Three white English pointers raced along the weedy edge of a bare field, Lady ahead, Bo and Cody strung out behind. Down the slope lay a stock water hole and beyond it a hardwood bottom standing in water. Lady slipped like a serpent through the greenbrier and honeysuckle along the swamp edge; then, as if she had hit a wall, locked on point near the water hole. The other two dogs honored instantly from far back.

Alan Stephenson shouted "Point!" and hurried across the sprouting rye toward Lady standing chin high and steady. Gene Stephenson, his uncle, stepped quickly up to the right. They were not as close as they would have liked when the covey rose against the dark swamp in an explosion of wings, but it didn't matter. Alan got off five shots as fast as a shotgun can fire, and five bobwhite quail fell into the brambles amid a flurry of feathers. Gene shot once, and though a bird fell, he howled with disappointment. The spent shell had hung in the receiver, preventing a second shot.

Within minutes the dogs had retrieved the downed birds, but it took time for Gene to recover from his bad luck and repair his usually jolly demeanor. (He takes his quail hunting seriously.) Gary—Gene's brother and Alan's father—caught up and joined them to root out the singles. The remaining birds had gone down in a large tree on its side deep in the partially logged swamp. One by one, the gunners took four singles with impressive efficiency.

***As two quail burst** into the sky, Alan Stephenson (right) and his father, Gary, display a level of marksmanship honed by years of a love for the sport. Each describes how, at the moment of flush, the covey-rise seems to unfold "in slow motion," allowing the hunters to make consistent shots.*

***Gene, Alan and** Gary Stephenson enjoy a break in the shooting action after a day afield. The family is woven together by the common thread of bird hunting—spanning many miles and transcending generations.*

Over three seasons, I have occasionally tagged along with this family of hunters. Gary, approaching 60, is a retired businessman. Gene, a shade older, is a salesman. Alan, not yet 40, is a research technician and gifted wing shot. The three hunt together as many as 50 days a season, often with a guest. In recent years they have hunted a five-county sector of the eastern Piedmont and Coastal Plain with remarkable success.

The N.C. Wildlife Resources Commission's avid hunter survey, a measure going back 15 years, reports an average of less than two coveys found per trip in recent years, down from three in 1983. The Stephensons continue to find about six. While the statewide average harvest has fallen to two to three birds per gun per trip, the Stephensons and their guests continue to take six to seven.

Quail hunting really is a year-round exercise for the family. Since 1971 they have bred and trained their own dogs, and those English pointers are of high quality. Gary said he and his brothers had bird dogs at their home in Johnston County since their earliest years. His father owned a line of Lewellyn setters. When Gary moved his family near Raleigh in 1971, he started anew with English pointers, he said, buying local dogs from the famous Delivery line and one from western North Carolina.

Alan's hunting career has been marked by variable success since a peak in the late 1980s when regulations were changed to allow five shells in a gun. He and his dad and uncle came to expect bag limits of 10 birds each.

"If the three of us went, we got 30," he said. "If a guest joined us, we got 40."

However, their average kill fell to its lowest point, about seven birds per hunter, during the early 1990s. Responding to low quail populations statewide, the Wildlife Commission reduced the bag limit to eight birds in 1996. In recent years, the Stephensons have been able to improve their success in terms of a percentage of the limit, but they still carry individual averages of about seven birds each. That remains two to three times the average of the state's most ardent hunters.

"When we have hunted with three people during the last two years," Alan said, "we've had a 20-bird average; if we hunted with four people, we had a 24-bird average."

What accounts for a success rate two to three times the mean of the state's most avid hunters? Perhaps it's the Stephensons' passion for quail hunting.

"There's nothing any of us would rather do," Alan said.

They come by their passion honestly. Alan's grandfather, Sherrill Stephenson, who grew tobacco and owned tobacco warehouses, was said to be one of the best bird hunters in Johnston County. His father, Ethridge Stephenson, was an ardent fox hunter.

"So my dad and uncle and their younger brother, Uncle Landis, grew up hunting," Alan said.

"My dad taught me everything I know," Alan said. "He'd come back from a hunt and drop some of the birds around me when I was two or three years old. I took an interest in them. I guess I started at age five with a BB gun. By the time I was 11 or 12, my mom was dropping me off to shoot doves with a shotgun. Can you imagine that these days? She'd pick me up at dark, and I'd have a sack of birds," he said. "I've been blessed."

Alan showed exceptional wing-shooting skills early, Gary said. He had given Alan a single-shot .410 when the boy was nine. By the time he was 14, Alan was shooting a 12-gauge autoloader with a 24-inch improved cylinder barrel "better than most experienced hunters," his father said.

When pressed, Alan will confess that the first time he was taken to a trap range, he shot clay pigeons in groups of five over 100 times without a miss. When he dropped five quail on the first covey rise I ever saw him shoot into, I was astounded. Minutes later I happened to be standing behind him as a single flushed and flew away from us, weaving between trees in the thick swamp. I watched with fascination as Alan swung left and right, anticipated the bird's emergence from behind a trunk, then balled it up with one shot. It was the kind of shot only a handful of people could make.

But all the Stephensons shoot extremely well. When a covey rises, they bring down considerably more birds than the average shooter, a fact which alone could account for their high success rate, all other factors being equal. They all describe how a covey-rise unfolds "in slow motion" in their minds, how they can anticipate birds crossing so two or more can be taken with one shot. For most

***Alan Stephenson** gently molds his dog into a proper point. The success of a bird hunt is completely dependent on the ability of the dog being used, and Alan is a meticulous trainer.*

hunters, that would be a rare and completely unplanned occurrence. But Alan, no doubt among the best field shots in the land, says the shooting is the least important reason for their success. He credits experience and the desire and willingness to hunt hard.

The Stephensons hunt in all conditions, most days from early morning until late evening. This extra effort, they say, grows out of their love for the sport and the desire to do it well. Gary and Gene also attribute their dedication to having seen their father hunt, often six days a week.

"You get out of it what you put into it," Alan said.

The full explanation probably lies in a synergy of factors, including a legacy of hunting, to-the-hilt commitment, years of experience, good dogs and inherent shooting skills honed by extensive practice.

But another factor contributing to the Stephensons' extraordinary success is the many hunting places they have collected—450 of them according to Alan, up from 350 just three years ago.

"We've always been friendly with landowners," he said. "We take the time to stop and talk. We help elderly ladies build fences; we visit in the off season. And when the holidays come around, we give away a lot of turkeys and hams—and a few bird dog puppies."

The Stephensons are familiar with the farms and how the coverts on them change over time. They hunt efficiently, visiting many locations in a short period of time. Among them, the trio possesses more than 100 years of hunting experience, enabling them to select the best strategic option most of the time.

In 1981, Alan started keeping detailed records of their hunts, partly to make informed decisions about where to hunt. In a journal, Alan has recorded data on all of their hunting locations. The information includes location, success rate, weather and the specific dogs used. On computer spreadsheets, he compiles the journal entries into such categories as number of hunts, coveys found, birds bagged, time of day and other factors.

"We had a long list of locations we could hunt," he said, "and I wanted to compare how we did at each spot." Alan also confessed that he had a sense that they were enjoying exceptional quail hunting, probably doing it better than others, and he wanted to document it.

One morning last February, one of the wettest on record, we had to wait out the rain. Then the birds we found in the soggy fields flushed wild at a distance for no good reason and flew far. But between showers, we managed to bag a few quail before we broke for lunch in Stantonsburg. Over barbecue and sweet iced tea, they recalled the season.

"It started out mild," Alan said, "and stayed that way. We had only three cold, windless days all season, I think. It had to be the warmest season we ever hunted—and the wettest."

***Much of the** Stephensons' hunting success can be attributed to the sheer number of locations they have to hunt. They presently have 450 such locations, up from 350 just three years ago.*

Bad luck also limited their success. Gene took a fall and sustained a knee injury that sidelined him for weeks. They had lost Bo, one of their best dogs, to cancer the previous May, and Lady simply disappeared on a hunt in January.

"In 11 years she had never been lost on a hunt," Alan said, shaking his head, "even for a few minutes." He still owns, but does not hunt, Lady's mother, now 18 years old.

The event remained emotional for the family as they continued into spring searching and distributing circulars to no avail.

But despite the difficulties, they were almost able last season to equal their average performance of recent years. Alan said they hunted 36 full days and four half days, while in past seasons they managed to get out 40 to 50 days.

"We hunted a little harder," Alan said. "Fortunately we had a lot of new places to hunt. And coveys this year were bigger. That helped."

Jack Penny, a veteran Durham hunter, came by and confirmed the late-season pattern the Stephensons were observing.

"February was so warm," he said, "the birds didn't have to feed. Many days we couldn't find a covey all day, then we might locate three or more between four o'clock and dark."

He also noted the increased covey size.

Bigger coveys, the Stephensons agree, probably can be attributed to new plant growth associated with trees downed by recent hurricanes. Often cold, rainy weather just after chicks hatch in the spring causes high mortality.

"Last spring was unusually dry," Alan said, "so a lot of chicks probably survived. And there must have been more cover and insects than in an average year. Better chick survival means bigger coveys."

The Stephensons agree that habitat remains the most important factor in quail populations.

"If the habitat is right," Gene said, "birds can take care of themselves. Sure, there are more hawks, but they are no worse than opossums and raccoons."

They all believe quail predation has increased over the years and no doubt has become a significant factor limiting production. But Gary sees problems, too, in abandonment of traditional burning practices and with pen-raised quail liberated into the wild.

"They attract predators that take the wild birds," Gary said. "And they introduce diseases to the wild population. You don't find many wild quail around a shooting preserve."

The three quail hunters closed the season with mixed feelings, but looking to the future.

"We're rebuilding," Alan said, "but we'll be back to full strength by next season."

In the spring, Alan was looking for a worthy pointer bitch to bear a litter from their kennel's bloodline. Only the best qualified need apply. ⊠

Twilight for Oysters

North Carolina's oyster stocks, declining for a century, have plummeted in recent decades, threatening the oystermen's livelihoods and the health of our estuaries.

written by Rodney Foushee
photographed by Melissa McGaw

A timeless search: *With the tide falling, a lone oysterman (left) methodically works the shellfish beds of the lower Lockwoods Folly River in search of his limit. With favorable tides, an experienced oysterman can gather five bushels of oysters by hand in a few hours. A piece of bent iron called a "knocker" (close-up, above) is used to break off the legal-sized oysters.*

Roy "Peck" Varnum, ever bent at the waist, moves quicker than normal this late October morning to catch his limit of oysters. Low water occurred before daybreak, and the clear ocean of the rising tide is already starting to make its way back over the fog-shrouded oyster beds of the lower Lockwoods Folly River.

With nimble hands belying his age, the Brunswick County man expertly eyes the exposed shell mounds and picks out the large, legal-sized oysters seemingly hiding amid the mass of shell and mud. His wife, Rochelle, works alongside. In a rhythmic fashion, the couple fill one metal oyster basket after another, pausing only briefly to dump their muddy catch into burlap sacks. Marsh hens keep a silent watch in the nearby cordgrass as each bushel sack is carefully arranged in a small wooden skiff.

Even with favorable tides, you can't move too much if you want to be any good at oystering, Varnum explains, as he uses a piece of bent iron called a knocker to expertly break off three nice 4-inch oysters from a cluster of shells and smaller oysters.

"You've got to stay put to get your limit," Varnum says. "When you move too much, you lose time. In oystering, you're always working against the tides."

After working the oyster beds for more than 50 years, Peck can name every rock, or mound of oysters, in the river. His blue eyes flash, suddenly bright with the enthusiasm of a young boy—in stark contrast to the worn skin and white whiskers of the old man—as he recalls one name after another, pointing as he goes. "That's Romance Rock there, and this here is the S Rock. There's Drum Slough, the Galloways, Henry Rock, Gibbs Rock and Marsh Rock."

A handful of other oystermen are scattered across the low mudflats, each staking out his daily claim on the oyster beds of the lower Lockwoods Folly River. Nearly all are related, with last names of Varnum, Varnam and Galloway. The clang of the metal on shell is repeated a thousand times this morning as each oysterman tries to get his limit of five bushels. It is a sound that has been repeated along the North Carolina coast for hundreds of years.

But times are changing on the Lockwoods Folly, as at other places along the Carolina coast. Half-million-dollar houses ring the fertile salt marsh where generations of Varnums and Galloways have survived catching oysters, clams, shrimp and fish. The familiar sickly green shellfish closure signs denoting polluted waters are just a few hundreds yards upriver from where the oystermen work.

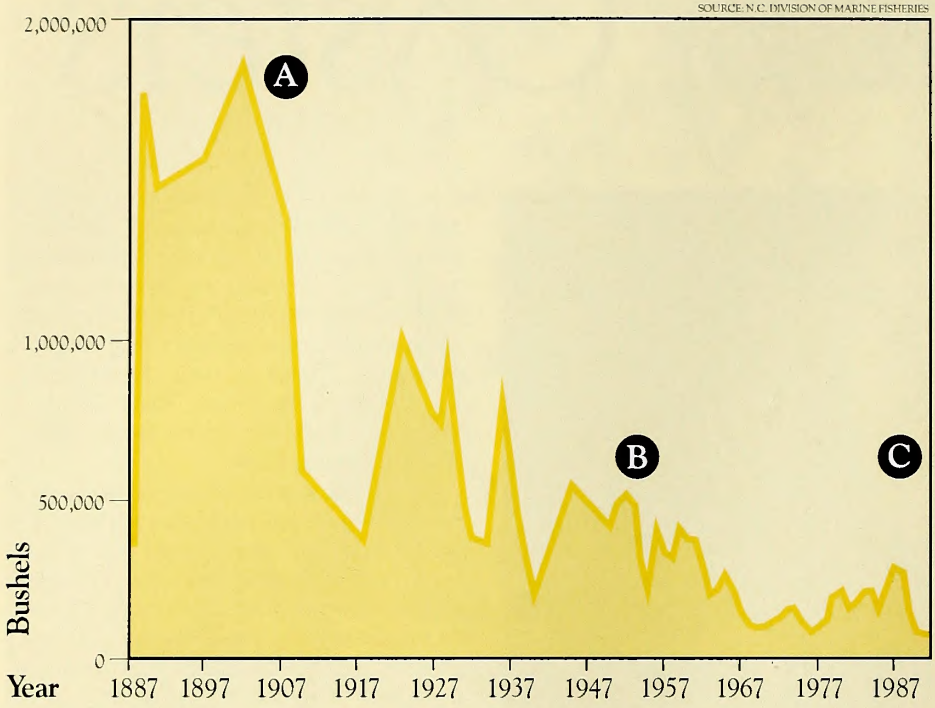
The tides of change are working against the Carolina oystermen and their fishery. Once supporting an annual harvest of nearly 1.5 million bushels at the turn of the century, the fishery has declined to the point that only about 40,000 bushels of oysters are harvested each year from North Carolina waters. Disease, pollution and overharvest have left only skeletal remains of the Tar Heel oyster industry, with most of the meager catch coming from the extreme southern counties, especially Brunswick. The solemn gathering of a few dozen oystermen on the Lockwoods Folly River represents, in many ways, the end of an era.

The Amazing Oyster

Despite its simple bivalve design, the American oyster (*Crassostrea virginica*) occupies a unique position in North Carolina's estuaries. This is because oyster colonies readily form reefs that serve many critical purposes. They create productive habitat for young fish and other marine species, filter

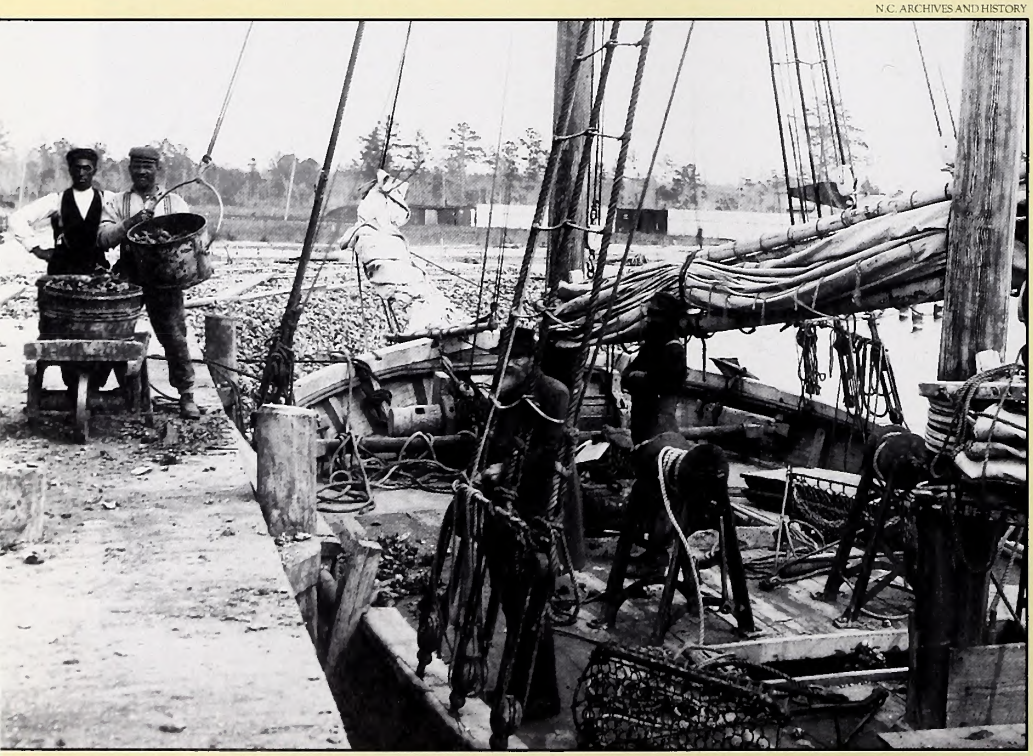
THE FALL OF NORTH CAROLINA OYSTERS

SOURCE: N.C. DIVISION OF MARINE FISHERIES



North Carolina's oyster stocks have been in a nearly steady state of decline for the past 100 years. Much of the early decline can be blamed on overharvest by dredging and lack of enforcement of existing fisheries laws. The gross overharvest by dredges led to a collapse in the state's oyster fishery in the 1910s (**A**). State oyster harvests rose and fell with economic hardships and wars over the next 40 years, averaging about 500,000 bushels per year. From the 1950s to the 1980s, oyster harvests in the state fell five-fold (**B**) to about 100,000 bushels due largely to coastal development and pollution. Since 1989, naturally occurring oyster diseases have further reduced state harvests (**C**) to about 40,000 bushels per year.

N.C. ARCHIVES AND HISTORY



the water of pollutants and provide a buffer against strong currents and sedimentation in the estuary. And the animal itself is an important food source for a myriad of aquatic and land species, including humans. Oysters and other shellfish have served as an important source of protein for coastal inhabitants ever since the first humans arrived on the North Carolina coast some 12,000 years ago. This trend continued until recent years, with oyster harvesting remaining the state's most valuable shellfishery until the 1970s.

Dubbed the quintessential estuarine animal, the oyster can tolerate a wide range of salinity, temperature, turbidity and dissolved oxygen levels making it well adapted to the constantly changing conditions of the estuary. Scientists estimate that *Crassostrea* has survived for 135 million years. Not only is it an important species itself, but the American oyster is also a good indicator of the overall health of North Carolina's coastal sounds and estuaries.

Ranging along the entire East Coast and the Gulf of Mexico, the American or eastern oyster is at home in brackish and saltwater environs. In North Carolina, the oyster is found from the extreme southern end of Albemarle Sound southward through the state's sounds and estuaries to the South Carolina border. As a filter feeder, the oyster feeds on tiny plankton and algae found in the water column. To meet its food requirements, the amazing oyster can filter up to 10 gallons of water per day!

A vigorous spawner that can actually change sexes once each year, the female oyster releases up to 15 million eggs during the spring, which unite in the water with sperm from males to form tiny larval oysters. After floating at the mercy of the currents for two to three weeks, larval oysters attach for life to a suitable hard surface, especially other oysters' shells. This affinity for other oysters is the building block of oyster reefs.

When the first Europeans arrived on the Carolina coast several hundred years ago, they were amazed at the abundance of oyster beds they found. Many sounds and bays were so richly carpeted with oyster reefs that they impeded all but the most careful boat captains. Beneath the surface, these huge oyster rocks supported massive numbers of young fish and invertebrates by providing cover and food. They served the same functions as

***Brought to North Carolina** in the late 1800s from northern states, large sail-powered dredge boats (left) helped harvest more than a million bushels of oysters annually into the early 1900s. These early oystermen display their day's catch on the docks in Washington in 1884.*

tropical coral reefs. These ancient oyster reefs also provided a buffer from strong currents and sedimentation, helping to stabilize the estuary, while the living animals inside helped filter and purify the water.

Of course, the settlers didn't have to learn to eat oysters. Revered since Roman times, the oyster has been an epicurean delight in Europe for centuries. Following the example of Native Americans, early Europeans in North Carolina began harvesting oysters for food. Much of the original harvesting was done by hand in much the same way used by the modern oystermen of the southern coast. These intertidal oysters, also called "coon oysters" because raccoons have an affinity for them, were removed when they were exposed at low tide. Though it never equaled the magnitude of the oyster industry of the state's northern neighbors, a substantial oyster fishery developed in North Carolina after the Civil War. Large oyster markets emerged in Wilmington and New Bern. Beaufort and Washington also had significant trade in oysters. All legal oystering was conducted by hand, either by taking coon oysters or by using tongs to remove shallow underwater oysters. Oysters were prohibited from being sold out of state until 1872.

However, the state's vast deep-water subtidal oyster population (those oysters never exposed by the tide), covering much of Pamlico and Roanoke sounds, was not harvested until 1889, when, after depleting their own resources, oystermen arrived from Chesapeake and Delaware bays with large dredge boats to exploit the virgin stock of Pamlico Sound. So began the "Oyster Wars," brought on by a quirk in a state fisheries law that prohibited dredging by Tar Heel residents in waters less than 8 feet deep in Pamlico and Roanoke sounds but didn't prevent out-of-state oystermen from dredging anywhere in North Carolina waters.

Skilled with the use of sail-powered boats pulling heavy dredges, the northerners quickly caught large numbers of oysters. Local fishermen relied heavily on hand tonging and were not familiar with dredging operations. After many attempts to close the legal loophole, a law prohibiting nonresidents from harvesting oysters was put in place and enforced in 1891. But the introduction of the dredge boat opened up a new era of oyster harvest and exploitation in North Carolina waters, as local watermen soon adopted and mastered dredging methods themselves.

***"I like to oyster. I'd** rather oyster than anything else," explains Roy "Peck" Varnum, who has been oystering for a living in Brunswick County for more than 50 years. At age 62, Varnum (above, with his wife, Rochelle) has witnessed the steady decline of North Carolina's oysters.*

Decline of Oysters

Oyster stocks in North Carolina have been in a nearly steady state of decline for the past 100 years. Much of the early decline can be blamed on overharvest by oyster dredging and lack of enforcement of existing fisheries regulations. Even though dredging was blamed for the rapid depletion of oyster stocks in Delaware and Chesapeake bays a century ago, once the practice was introduced into North Carolina waters, Tar Heel watermen embraced the new harvest method. After a brief ban on dredging, the method was reinstated in North Carolina waters in 1895 and was largely responsible for annual harvests in excess of 1 million bushels of oysters during the late 1800s. Gross overharvest continued into the early part of the 20th century, with

the largest Tar Heel oyster harvest on record —1,833,000 bushels—posted in 1902.

Despite later attempts to restrict dredging, much of the damage to North Carolina's virgin oyster stocks was already done by 1910. After 1908, harvest levels exceeded 1 million bushels only once—in 1923. With the removal of vast quantities of shell material and adult oysters for future spawning, the massive underwater oyster reefs of Pamlico Sound were decimated. Oyster beds that took centuries to build were mined away by dredges in mere decades. Still, Pamlico Sound continued to produce about 90 percent of the oysters harvested in North Carolina through 1950, with statewide harvests averaging about 500,000 bushels per year.

Since that time, a much steeper decline has occurred in North Carolina's oyster stocks and harvests. From the 1950s to the 1980s, oyster harvests in the state fell fivefold from about 500,000 bushels per year to just 100,000 bushels per year. Biologists blame much of this on unprecedented coastal development and continued overharvest.

Many fragile estuaries harboring oysters were damaged or destroyed by the construction of homes, docks and businesses along the water's edge. Meanwhile, pollution runoff from developed areas forced the state to close many productive shellfish areas to harvesting. Nearly 15 percent of all North Carolina coastal waters are now closed due to pollution; along the southern coast, development has forced the closure of up to 70 percent of the prime shellfish waters in Brunswick, New Hanover, Pender and Onslow counties. Discharge of treated wastewater and other industrial wastes into eastern rivers and sounds, spurred by human population growth, has only worsened the pollution problem and contributed to declining water quality. Oysters, especially larval oysters, are highly sensitive to long-term environmental stresses, including chemical runoff and low dissolved oxygen levels. Even in small amounts, the common chlorine compounds used to treat wastewater can easily kill young oysters.

***The shellfish closure** sign is becoming an all-too-familiar sight along much of the Tar Heel coast, especially in the rapidly developing southern counties where as much as 70 percent of the prime shellfish waters have been closed because of pollution.*

Since 1989, the naturally occurring parasite dermo (*Perkinsus marinus*) has been responsible for major oyster kills in North Carolina, especially in the northern coastal waters. First detected in North Carolina in the mid-1950s and probably existing here for thousands of years, dermo caused no problems until the past decade. Biologists theorize that poor water quality from pollution has weakened oysters to the point that they can't fend off the parasite. Changing climatic conditions may also be favoring dermo's spread.

Infecting young oysters, the insidious parasite wears oysters down over many months, killing them before they reach a harvestable size. "Dermo has had a serious impact on oyster landings in Pamlico Sound," said Mike Marshall, a resource enhancement section chief with the N.C. Division of Marine Fisheries. "Landings there have basically been nonexistent for the past few years."

Oysters along the southern coast, especially those in small tidal estuaries like the Lockwoods Folly River, appear to be more resistant to dermo. "The impact is not as severe along our southern coast," Marshall said. "The oysters are out of water part of the day, so they're not continually exposed to the parasite. The large lunar tides of the lower coast also help flush the estuaries with pure seawater, which appears to kill dermo."

***The successful** Oyster Relocation Program, sponsored by the N.C. Division of Marine Fisheries, helps provide oysters for both commercial and recreational gatherers (left) at several locations along the southern coast. Through the program, fishermen are paid to relay shellfish from polluted waters into clean waters. There the oysters purify themselves before being harvested the next season.*

Another oyster parasite, MSX, has caused some problems in Pamlico Sound but not to the degree that dermo has.

With nearly all of the state's paltry annual harvest of 40,000 bushels of oysters now coming from the southern coast, the demise of Tar Heel oysters and oystering seems nearly complete. But the same story can be told of nearly every state along the eastern seaboard.

"Our oyster decline in North Carolina has been steadier than in other eastern states," Marshall said. "But we've all wound up at the same place—the bottom."

Oystermen like Roy Varnum can also see the end approaching as the few remaining viable oystering areas slowly slip away to development. "I think in another 10 years, you won't be able to take anything in the Folly River," Varnum said. "Every year, the pollution moves farther down the river. Sooner or later, the whole thing will be closed."

Hope for Oysters

Despite the disappearance of most of the oysters in Pamlico Sound and low harvest rates across the remainder of the state, Marshall and other scientists are hopeful that something can and will be done to help North Carolina oyster stocks, currently listed as depressed, rebound. For years, the Marine Fisheries division has helped the stocks by planting cultch material—old shells—to establish new oyster reefs. The division also operates a very successful Oyster Relocation Program, which pays commercial fishermen to relocate oysters from polluted waters into clean waters, where they can purify themselves and be harvested during the next oyster season. This past spring, oystermen, mainly in the southern coastal counties, relayed more than 20,000 bushels of oysters from closed shellfish beds to clean ones. These will be harvested this fall.

To address the state's pervasive oyster crisis, the N.C. Blue Ribbon Advisory Council on Oysters was established in 1992. After three years of study, this coalition of scientists, fishermen and seafood processors made sweeping recommendations to boost the stocks—more support of mariculture, or saltwater fish farming; an increase in oyster relocation and reef-building programs; mandates on improving coastal water quality; and emphasis on developing disease-resistant oyster strains. Though few of the recommendations have been carried out yet, they were passed on to the Marine Fisheries Commission and a joint legislative commission for the development of an oyster management plan. The landmark Fisheries Reform Act, passed by the General Assembly last year, mandates that the state establish a long-term management plan for oysters and several dozen other important marine species in the coming years. The Marine Fisheries division in September was hammering out the initial stages of an oyster restoration plan for North Carolina.

The significance of North Carolina's declining oyster population is about more than a fishery or the few people who still depend on it for their livelihoods. The importance of the oyster lies in the vital role it plays in a healthy estuary. Despite its simple nature, the oyster forms the backbone of this rich, complex ecosystem, providing a nursery structure for countless immature fish, crabs and other creatures.

In large numbers, oysters also serve as natural water filters, cleansing the sounds and bays of suspended matter and pollution.

Meanwhile, Roy Varnum and the state's few hundred other remaining oystermen are just a couple of weeks into the fall harvest season. Hanging on to the past, they ply the calm backwaters in wooden skiffs in search of a few oysters to meet the needs of coastal residents for traditional holiday oyster roasts.

Though it's hard, solitary work, oystering —like other commercial fishing activities— has an almost sacred status to its practitioners. Independence is the key ingredient.

"I like to oyster. I'd rather oyster than anything else," Varnum says proudly, as he hefts another basketful of shellfish into his boat. "I like being my own boss. And I like working on the river."

Despite his seemingly independence from the strains of the modern world, Varnum, like other oystermen, is inextricably connected to the coastal rivers and sounds and their dwindling resources.

"This is God's country," he says, pausing from his work briefly to point out with a gloved hand the expanse of the salt marsh beneath the crisp autumn sky. "He made a way for us to make it oystering and shrimping here on the river. I couldn't ask for more. But you take me away from here or take the river away, and I wouldn't make it."

A slight breeze whispers through the cordgrass as Varnum continues his work. The soft sound of metal clanging on shell in the marsh almost seems a memory, but the rhythm is real if you take the time to listen for it. ⊠

***With the tide coming** in strong, a Brunswick County oysterman hauls off his last basket of oysters for the day. Scientists, meanwhile, hope they can reverse a 100-year decline in North Carolina's oyster population before it is too late.*

The World Is FULL of Moths

If God loved butterflies, perhaps He loved moths more. The night-flying moths outnumber the sun-loving butterflies by more than 10 to one.

written and photographed by Harry Ellis ©1998

When I was a boy, I liked to collect as many cocoons of the big silk moths as I could find during the winter and keep them on our screened back porch. Inside each cocoon there were wings in the making and so hatching time in the spring became a special event for me, as the spectacular adults emerged—graceful pale green lunas with ribbon-like "tails," polyphemus moths with huge, staring eyespots on their wings, and strikingly patterned prometheas and cecropias.

Sometimes when one of my back porch moths hatched and remained clinging inside the screen for a night, other moths of the same type would come and perch on the outside surface of the screen, trying to get inside. I was not aware of it then, but I now know that when this happened the moth inside was a female. Her scent—a chemical substance known as a pheromone—attracted males from all over the countryside with their great fernlike antennae serving as olfactory sensors, organs infinitely more sensitive than the keenest nose of any bloodhound.

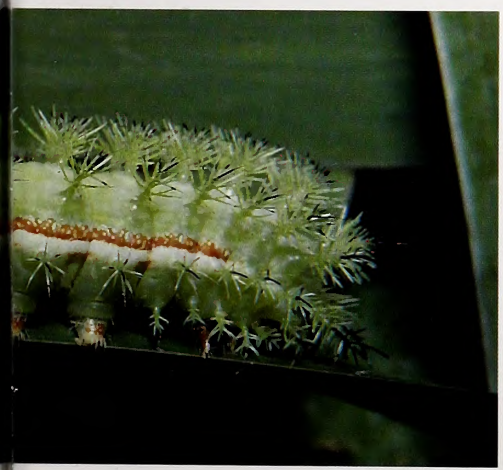
On many summer evenings of those distant years, after supper was over, I would go out under the big oak trees at the edge of the nearby meadow and watch the sunset and the coming of night. When fireflies began to glimmer in the deepening twilight and the whippoorwills were calling, the big moths were also out, large batlike forms flitting under the trees. I marveled at their grace and beauty then, and I still do today.

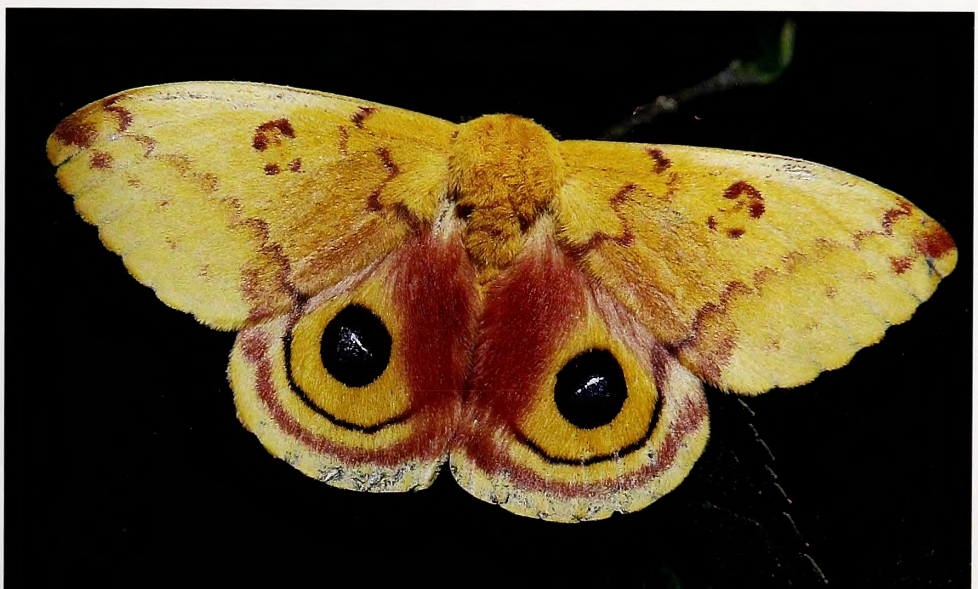
Esteemed for the beauty of their brilliant, intricately patterned wings, moths and butterflies make up the order Lepidoptera, with approximately 170,000 known species worldwide. There are some 12,000 species in North America, but only about 760 are butterflies, and the rest—more than 11,000 species—are moths. The wings of both moths and butterflies are covered with tiny, elaborately pigmented scales in overlapping rows, somewhat like the shingles on a roof. In many species the scales appear to be splashed with every tint of the rainbow. No other order of insects contains such gaudy beauty.

Moths differ from butterflies in that they generally fly at night, although there are exceptions to the rule, while butterflies are daylight creatures. When a butterfly is resting, it usually closes its wings vertically above its back, tips together. But when a moth rests, it spreads its wings out flat like a grounded airplane or, in some species, folds them roof-like close to the body. Butterflies have simple antennae with knobbed ends, while moths' antennae are more complex, often feathery.

Not only are moths 10 times as numerous as butterflies, but in the larval or caterpillar stage they do a thousand times more damage.

Moths have evolved *many intricate and colorful wing patterns, some of which can even deter predators, as the eyespots of the io moth (top right) show. If the moth (lower right) is disturbed, it pulls its forewings forward, revealing large spots that look like the eyes of a vertebrate animal. The io moth's caterpillar (lower left) is adorned with poison spines.*





All moths pass through *four stages on their way from egg to adult: egg, larva (or caterpillar), pupa and adult. Pictured above are three caterpillars with their adult forms directly above. At left, the cecropia caterpillar and moth. At center, the imperial caterpillar and moth. At right, the royal walnut caterpillar (known as the hickory horned devil) and moth.*

Their caterpillars, with an insatiable appetite for green plants and green leaves, levy a toll of hundreds of millions of dollars annually on American forests, orchards and farms. Corn earworms, cutworms, apple codling larvae, tomato worms, army worms, peach tree borers and tent caterpillars are all the larvae of moths. The gypsy moth, after its accidental introduction from abroad into New England in 1869, has spread widely throughout the eastern United States, leaving a trail of hundreds of miles of leafless trees, and it is still out of control. Tussock moth larvae and tent caterpillars often do serious damage to shade and woodland trees.

Yet, though the larvae of many moth species are destructive, the insects as adults are generally desirable and beneficial. Ecologically, for example, moths are of crucial importance, a significant link in a complex food chain, fed upon by birds, bats, fish, rodents and predatory insects. They are important as pollinators of a number of flowering plants. Moths feed by sipping nectar from flowers through a long sucking tube, or proboscis, that is kept coiled like a watch spring when not in use. As the moth probes deeply into the flower to get the nectar, it fertilizes the blossom with pollen from the last flower it visited. Without a moth's attention, some of these plants might face extinction.

The sphinx moths (Sphingidae) are especially valuable pollinators, with long, flexible proboscises that enable them to reach the depths of blossoms. The bumblebee hawkmoth (*Hemaris diffinis*), a day flier, masquerades as a stinging bumblebee; another species, the hummingbird moth (*Hermaris thysbe*), resembles its namesake as it hovers in front of a flower. An effective pollinator of the evening primrose is the small rose-colored primrose moth (*Schinia florida*) which nuzzles deep into a primrose blossom to feast on the nectar, gets a good dusting of pollen on its body and wings and fertilizes the next flower it enters.

Some moth species *have developed remarkable abilities to hide themselves by mimicking natural forms. A good example is the larva of the geometrid moth which looks like a short twig complete with terminal bud.*

Every moth must pass through four successive stages on its way to maturity—egg, larva, pupa and adult. Let us take a close look at the almost magical transformation known as metamorphosis in one of the large silk moths, the cecropia.

When the female prepares to lay her eggs, she always selects a host plant that will provide the best nourishment for the larvae. The eggs are small. In some species they are smooth and drab looking; in many others, however, they are brightly colored and often beautifully decorated, sculptured and patterned with pits, grooves, lines and ridges. There seems to be no logical reason why each tiny egg should be designed with such artistic symmetry and perfection, like some rare, carved jewel. But perhaps Thoreau had the right explanation when he wrote, "Not a snowflake escapes Nature's fashioning hand."

Within a few days, each egg hatches into a tiny caterpillar that eats ravenously for a month or six weeks until it is fat, fully grown and 4 inches or so in length, but bearing no resemblance to the adult moth it will become. It then grows restless and begins wandering about, searching for a twig on which it will spin its cocoon, a tapering silken case of extreme toughness and strength. The silk substance comes from the spinneret on the caterpillar's lower lip or labium, at the opening of the silk gland. In the operation of spinning, the caterpillar slowly waves its head back and forth, attaching the strands of silk in a crisscrossing manner around itself and to the twig to form the cocoon—an oval, silken chamber made from one continuous thread of silk several hundred feet long.

The days of the creeping caterpillar have come to an end, as its prison of silk encloses it. Inside the cocoon it changes

to a pupa, awaiting the coming spring.

Months pass while winter winds roar. Inside the cocoon, the pupa rests in incompleteness and sleep, resembling the mummy of an Egyptian pharaoh. Inside the pupa, an almost incredible transformation is taking place, old parts wasting away and new parts forming into the specialized organs of the adult moth.

Finally, when its time has come, the cocoon softens at one end, and an elegant winged creature pushes its way headfirst to freedom. The wings are damp, crumpled and useless at first, but the sun and air quickly dry and straighten them. With the coming of dusk the moth is ready to fly aloft on colorful wings, seek a mate and reproduce. It soon dies, having lived only long enough to complete nature's plan.

During the day, the night-flying moths lie low, hiding among dead leaves or clinging to tree trunks. The wings of some species resemble lichen-covered tree bark so much that they are virtually invisible to hungry birds. These moths have an amazing instinct for selecting backgrounds most suited to their camouflage, settling on surfaces where the color and pattern on their wings cryptically match the color and markings of the background. This is true for both the adults and the larvae, as green caterpillars usually select green leaves and twigs on which to rest, and brown caterpillars seek out brown ones.

Among many species that are masters of cryptic coloration and deceit is the family of geometrid moths—both the adults and larvae. The larva, called a looper, is noted for its resemblance to a twig. If threatened, it can simply "disappear" by holding on to a branch with its hindmost set of prolegs and stiffening its body out in space until it looks for all the world like a short, stiff twig, which it mimics down to the smallest detail of texture and structure. Its head even resembles a small terminal bud.

In many cases, moth coloration actually invites attention. For instance, the virgin tiger moth (*Grammia virgo*) is distasteful and toxic to birds, which have learned to avoid it. It has black front wings with narrow, cream-colored bands and bright red hind wings that are hidden by the front wings when the moth is resting. When disturbed, it suddenly uncovers its brilliant hind wings, and any bird tempted to eat the handsome creature is warned of the danger by the sudden flash of shocking color.

Several species of moths have evolved conspicuous circles on their hind wings that resemble the eyes of vertebrate animals, and these are usually kept covered by the front wings when at rest. But if the moth is approached by a potential enemy, it suddenly pulls its forewings forward, exposing the staring "eyes" in an exhibition that can frighten any predator.

Some moths survive by simply looking dangerous and playing a game of bluff. The most awesome looking of all caterpillars is the larva of the attractive royal walnut, or regal, moth. With several pairs of long, colored spines on its head and thorax, this caterpillar looks so terrifying that it is known as the hickory horned devil, but it is entirely harmless.

As an aid to survival, several moth larvae have developed a system of chemical warfare, their bodies bearing numerous venom-filled, sharp spines that can pierce the skin of an enemy or of a man and cause considerable discomfort and pain. Examples are the pale green larva of the io moth and the saddleback caterpillar.

Besides their major enemies—birds and bats—moths face many other foes. Among the most dreadful are ichneumon wasps and other parasitic wasps, which hover nearby awaiting the chance to plant their eggs in the bodies of unwilling victims. The large, green tomato hornworm—larva of a species of sphinx moth—frequently carries dozens of small white capsules on its back. These are cocoons of the parasitic braconid wasp (*Apanteles congregatus*) that develop from eggs laid inside the caterpillar's body. After feasting on its tissues, the wasp larvae emerge to spin the tiny cocoons on the back of the dying host.

Another predator, the caterpillar hunter (*Calosoma scrutator*), is a large predaceous ground beetle that devours caterpillars in great numbers, even climbing trees in search of them. It attacks many harmful species, including gypsy moth caterpillars. Strangest of all enemies is the moth fungus *Cordyceps tuberculata*, which grows on the bodies of adult moths, its mycelium and fruiting spikes completely encasing the host and often attaching it to a branch or twig. The fungus is known to occur only in North Carolina.

Each year, with the coming of winter, when the earth around us seems frozen and dead, moth-life retreats into the cocoon and the sleeping, mummylike pupa, with the certainty that when the great flood-tide of awakening life moves northward in the spring, it will triumph again, and the cycle of each life will begin anew. In all her acts, nature affirms her faith in the future. ⊠

***When the caterpillar** of the sphinx moth metamorphoses into an adult, it becomes a valuable plant pollinator. It develops a long, flexible proboscis that can penetrate deeply into flower blossoms.*

***The bold coloration** of the virgin tiger moth practically shouts a warning to all would-be predators. The moth is so distasteful that predators immediately shy away from attacking it.*

SCOTTY LOVETT

Our Biggest DUCK CLUB

Even if you don't have the cash to join a private waterfowl club, membership in the state's biggest club—the Wildlife Commission's 26 waterfowl impoundments—comes with the cost of your hunting license.

written by Chris Powell

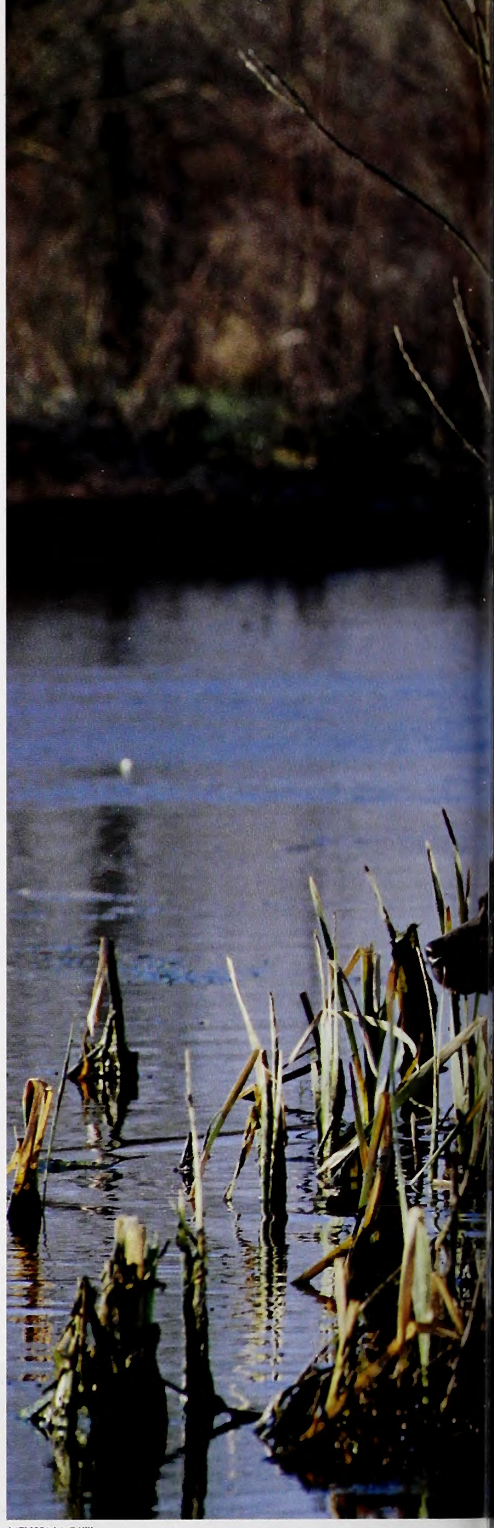
Once easily available to the "average Joe," coastal duck hunting has achieved an exclusionary status comparable to that of golf and tennis. Gone are the days when a hunter could choose from any number of ponds or salt marshes to set up decoys. Now, many of those wetlands are either developed or locked up by private hunting clubs. And what coastal waterways remain are dotted with family blinds, protected like precious waterfront property.

For a sportsman wishing to hunt waterfowl, this means either shell out big bucks or start hunting public impoundments. "For a middle-income person who can't afford a membership to an exclusive gun club, public impoundments give you accessibility to prime waterfowl hunting in prime areas where clubs basically surround you," said Mike Hillegass, regional director for the central North Carolina chapter of Ducks Unlimited.

That sentiment is shared by Robert Massengill, a Clayton resident who hunts Pamlico Point a few times each year. "I think the public impoundments are a great benefit," Massengill said, "because they offer anybody the opportunity to hunt in some excellent areas without having to secure a hunting lease or obtain permission from several different property owners. I also like the idea that hunters are required to be out of the impoundments by one o'clock; it gives the birds a chance to rest."

Since the early 1960s, the N.C. Wildlife Resources Commission has managed man-made wetlands tailored for ducks as well as duck hunters. Available to anyone with a proper hunting license, these waterfowl impoundments provide needed rest stops for migrating waterfowl as well as some high-quality shoots a few months a year.

Located as far inland as the Piedmont, the Wildlife Commission's impoundments range in size from 300 acres to 10 acres.



MELISSA McGAW

The facilities along the coast tend to be low marsh areas or pocosins that are diked and periodically flooded. Inland, the game facilities are dammed stream bottoms or flooded fields. Currently, the Wildlife Commission manages 26 impoundments, a number that continues to grow. This summer, the 9,700-acre Suggs Mill Pond tract (located in Bladen County) was purchased by the Wildlife Commission, which will manage it as a game land. In addition to the 600-acre Horseshoe Lake, duck hunters will have access to 80 acres of impoundments on the game land.

The Commission has also been anxiously

Since the early 1960s, the N.C. Wildlife Resources Commission has managed waterfowl impoundments—man-made wetlands tailored for ducks as well as duck hunters. Available to anyone with a hunting license, these areas provide needed rest stops for migrating waterfowl as well as some high-quality shoots a few months a year.

awaiting the completion of 10 waterfowl impoundments in the Butner-Falls of Neuse Game Land in Granville, Durham and Wake counties. By the time you read this, ownership of the Butner-Falls facilities may have already been transferred from the U.S. Army Corps of Engineers to the state. These man-made wetlands, totaling 860 acres, were developed by the corps as mitigation for construction projects in the Falls Lake area. Glenn McIntosh, project manager for the Corps' Wilmington district, said the facilities could be completed by the 1998 waterfowl hunting season. "Due to the high water experienced last winter, we discovered that we needed to do some additional work to the dike areas, like putting in some new spillways," McIntosh said. "We are waiting for a contractor to do that."

Four of the Butner-Falls facilities will be "green-tree" impoundments. These are essentially dammed stream bottoms that allow waterfowl to feed on undergrowth and mast in flooded woodland areas. "The way it works is you keep the water at a certain level for a period of time and allow the waterfowl to feed," said Harlan Hall, a Wildlife Commission regional supervisor. "Then you bring that water level up another 6 or 8 inches and that floods a number of other acres and allows the ducks to feed in another

F. EUGENE HESTER

***With his favorite** hunting buddy at his side, a duck hunter waits to see what ducks will pay this green-tree impoundment an early morning visit. Green-tree facilities are dammed stream bottoms that allow waterfowl to feed on undergrowth and mast in wooded areas.*

section." But not all of the impoundments are flooded during every hunting season. On a rotating schedule some are left dry to prevent annual saturation that may damage the mast-producing timber.

The Butner game land will also contain six waterfowl facilities of another type—open-field, food-plot impoundments. Open-field hunting locations are considered by some game managers to be the future of waterfowl impoundments. They are relatively inexpensive to operate, can be constructed most anywhere and offer ducks a virtual smorgasbord of food. These types of game lands are essentially farms that are leveled, diked, planted with crops such as corn, milo and buckwheat, then flooded from a well or nearby stream. Combined with the nearby Jordan Lake impoundments, the Falls Lake facilities should dramatically improve duck hunting opportunities in the Piedmont area. During the 1997-1998 waterfowl season, hunters reported seeing 1,250 ducks on the green-tree impoundments along Jordan Lake. While most of the waterfowl reported were mallards and wood ducks, the upland green-trees also attracted some black ducks, pintails, green wing teal and mergansers.

Open-field impoundments will also probably play an important role in the eastern part of the state because no additional salt marshes can be impounded. "There will be no more salt-marsh impoundments because the Division of Coastal Management will not permit them," said Allen Olmstead, a Wildlife Commission technical supervisor. "Any future impoundments will have to be converted fields."

For now, duck hunters in the East will have to rely mainly on the old favorites like Pamlico Point and Catfish Lake located in Beaufort and Pamlico counties. Built in the 1960s by request of the Pamlico County Health Department, some of the marsh impoundments were originally designed to control mosquito populations. The system works by raising water levels so that fish can enter the marshes and consume mosquito larvae; but ducks, colonial nesting birds, otters, nutria, blue crabs and many other species like to use the impoundments, too. As a result, the Wildlife Commission has been managing the facilities for the last couple of decades with remarkable success.

Like green-trees, salt marsh impoundments must be drained and kept dry on a rotational basis. This "moist-soil management" serves two purposes: it gives ducks a safe haven during fall migrations and allows soils to aerate for future vegetation. Without a vegetative "mat," the bottom of a marsh impoundment can become so soft that hunters will literally sink up to their waist.

"We drain the impoundments, allowing them to dry out," said Danny Ray, a wildlife technician for the Wildlife Commission. "The bottom will actually crack and oxygen can get into the soil. This oxidation creates a fertility process, which stimulates new growth." The resulting vegetation includes bocopu, barnyard grass and various types of spiked rushes. But to keep the menu varied, some of the marsh impoundments are managed for aquatic vegetation like musk grass and widgeon grass. This is accomplished by maintaining a water level of 1 to 2 feet in the impoundments, which are drained about every three years. The resulting variety of vegetation

transforms ordinary marshes into bed-and-breakfasts for migrating waterfowl, and the customers flock in by the hundreds. On the coast, hunters could encounter American widgeons, ring-necks, gadwalls, Northern shovelers, blue-winged teal, American green-winged teal, coots and black ducks.

But effort put into these facilities is not solely for waterfowl, shorebirds and other nongame species. After all, if it weren't for duck hunters' license fees and sporting goods taxes, these impoundments likely wouldn't exist. Wildlife Commission technicians spend considerable time each year making sure the facilities will provide a quality hunting experience. These efforts include repairing dikes, building and brushing handicap-accessible blinds, creating open spaces in green-trees and maintaining access canals on some of the marsh impoundments.

To manage the number of hunters, some of the more popular impoundments are available by permits; however, the majority of the facilities have general admission. When hunting any of these areas, you should follow basic rules of courtesy. Always set up before dawn, but no earlier than 4 a.m. by law. Tromping through an impoundment after daybreak scares off ducks and can ruin the best part of the morning for everyone. Also, refrain from "sky busting." Shooting at high-altitude birds will only divert flocks before they come into range. As a safety precaution, be sure to establish your hunting location at least a couple hundred yards from your nearest neighbor.

Hunters utilizing green-trees would be well advised to do some pre-scouting and carry a compass or GPS (Global Positioning System) for navigation. Similar-looking surroundings can easily be disorienting, and you can't backtrack submerged footsteps. Also recommended are chest waders and a good walking stick. The average depth of a green tree may be just a couple feet, but hidden stump holes and ditches can float a hat quicker than you can say, "Start bailing."

Hunting techniques vary between the different types of impoundments. Spreads can be as large as a few hundred decoys at the more accessible marsh and open-field impoundments, while hunters utilizing green-trees typically can carry just a couple of dozen decoys. Hillegass, who has hunted some of the Catfish Lake impoundments near New Bern, likes to use a drag boat to increase his decoy capacity. "I've got an old canoe that is real light and that I can put on top of my vehicle," Hillegass said. "I will float it in and pull it behind me to carry my gear."

Some of the impoundments have stationary blinds that are available on a first-come, first-served basis. Still, most hunters prefer either natural vegetation or portable camouflage such as brushed chicken wire. When hunting Pamlico Point, Massengill said he generally uses an 18-foot boat to tow a 10-foot johnboat. After negotiating the open water of Pamlico Sound, the hunting party floats the johnboat to a favorable location, puts out about five or six dozen decoys, then quickly converts the smaller boat to a makeshift blind. "We camouflage the boat with military netting," Massengill said. "The water is shallow enough so the boat sits right on the bottom, and you have a pretty sturdy hunting area."

The firearm of choice for most duck hunters is the 12-gauge shotgun. Massengill said he prefers a pump for a little extra knockdown power and, as a rule of thumb, shoots the heaviest 3-inch load he can buy. "When we are shooting big ducks, we generally shoot number 2s," he said. Also, No. 4 steel shot works well for teal and mid-sized ducks including widgeons.

Though hunters obviously benefit from impoundments, the real winners are waterfowl, which are provided undisturbed habitat during the majority of their migration periods. Not only is duck hunting limited to a few months annually, the impoundments are open just a few days a week and a limited number of hours, at that. As natural wetlands continue to dwindle, waterfowl populations will become increasingly dependent on more man-made rest stops. Fortunately, additional facilities remain possible because of the hunting opportunities impoundments provide to the "average Joe." ⊠

KEN TAYLOR

***The Goose Creek** Game Land, shown in this aerial photograph, contains 10 separate impoundments. Salt marsh impoundments, like the one shown, must be drained and kept dry on a rotational basis. This "moist-soil management" serves two purposes: it gives ducks a safe haven during seasonal migrations and allows soils to aerate for future vegetation.*

Do's & Don'ts for DUCK HUNTERS

The Wildlife Commission operates 26 impoundments, 19 on the coast and seven in the Piedmont.

All that is needed to hunt most impoundments are a pair of waders, a box of steel shot, a call and as many decoys as you can carry. However, to hunt some of the coastal island impoundments, use a sturdy boat to navigate the notoriously choppy sounds.

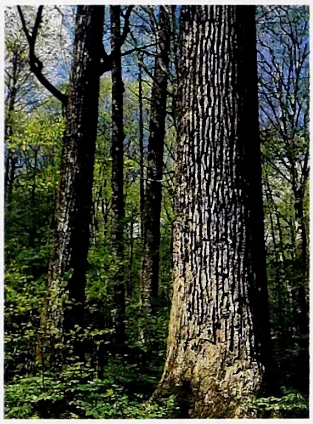
The laws governing the use of public impoundments are varied, so hunters would be well advised to review the *1998-99 Hunting Regulations Digest*. For detailed maps of impoundment locations, consult the *1998-99 Hunting and Fishing Maps for North Carolina Game Lands*. Copies of both publications can be obtained by writing: 512 N. Salisbury St. Raleigh, N.C. or calling (919) 733-7291.

EASTERN AREA

- **Goose Creek Game Land**
  Beaufort and Pamlico counties—10 impoundments (some by permit only)
- **Gull Rock Game Land**
  Hyde County—four impoundments
- **Holly Shelter Game Land**
  Pender County—two impoundments
- **White Oak Game Land**
  Onslow County—one impoundment
- **Croatan Game Land**
  Craven and Jones counties—one impoundment
- **Bladen County Game Land**
  Bladen County—one impoundment (by permit only)

PIEDMONT AREA

- **Jordan Game Land**
  Chatham, Durham, Orange and Wake counties—seven impoundments



WILLIAM S. LEA

Forestry for the New Millennium

In 1898, the opening of the Biltmore Forest School led the nation into the era of managed forests. A century later, new ideas are already shaping a new forestry for the 21st century.

written by
Lawrence S. Earley

In the spring of 1895, at the remote western North Carolina village of Biltmore, a thin young man with a thick, military mustache and a heavy German accent stepped down from the Southern Railway passenger car and looked around.

Biltmore was not impressive, especially to someone who was familiar with the great cities of Europe. The village consisted of just a few wooden buildings and a serviceable inn, where the new arrival spent the night. The next day he traveled a few miles to the grand estate, then being assembled by New York tycoon George W. Vanderbilt between the Swannanoa and French Broad rivers. Biltmore Estate was where the young man would live for most of the next 14 years, building a legacy of forestry education in America that endures today.

Carl Schenck had been hired by Vanderbilt to fill the position of forest manager recently vacated by Gifford Pinchot, who had managed the forests on Vanderbilt's 7,000-acre estate for the past three years. At the time, Americans were recklessly exploiting their magnificent inheritance of natural resources —wildlife, fish, forests—under the assumption that they were inexhaustible. It was this assumption that Pinchot wanted to change. His revolutionary concept: that American forests were renewable, that the same forest could produce "sustained yields" of timber over and over again.

Schenck, a native of Darmstadt, Germany, was chosen as Pinchot's replacement because there was no other trained American forester in the entire country. Indeed, what Schenck saw when he arrived at Biltmore in 1895 made him wonder whether his background in the carefully managed forests of Germany adequately prepared him for the chaos of this cut-over landscape. Littering the woodlands were thousands of dead and dying chestnut trees. Abandoned fields were deeply gullied from erosion, while in others failed plantations of white pines lay dying. Schenck judged that not a tree on the entire estate could be sold on the Asheville timber market. "There was no forest nursery in which to raise planting stock; there were no markets for forest products and no byroads to make the woods accessible," he later wrote.

Dismayed, he went to work immediately, ordering new planting stock from Germany, putting in roads and trying to teach his apprentices about things they did not know—why to cut this tree rather than that one; how many seedlings meant a successful reforestation experiment. It came to Schenck gradually that what was needed at Biltmore—what was needed in America—was a school where foresters could be trained. But such a school didn't exist in the country. The germ of an idea began to grow in his mind.

By the fall of 1898, the seed had sprouted and Biltmore Forest School, America's first forestry school, opened its doors to its first class of students. For 12 months the young student foresters studied silviculture, dendrology, lumbering and technology, plant classification, zoology, law, economics and other subjects. They learned how to transplant seedlings, cruise timber, fell trees and saw logs.

Though Biltmore Forest School had a short life—it closed in 1913—it had a tremendous impact on the fledgling practice of American forest management. Of its 300 graduates, half went on to practice forestry in the budding U.S. Forest Service, state forestry programs and private timber companies, many of them exercising influential roles in the coming decades.

This year, the centennial of Biltmore Forest School, Americans celebrate Schenck and Pinchot's revolutionary ideas: that forests are renewable; that the same forest can produce timber over and over again; that landowners can profit from their forests by managing them. But the anniversary also provides an opportunity to peer into the hazy mists of the new century looming ahead of us, a time that

THE FOREST HISTORY SOCIETY, DURHAM, N.C.

many believe will rival the last hundred years in terms of increasing our knowledge of forests. Former Forest Service chief Jack Ward Thomas has predicted that "the decade of 1995-2005 will go down in conservation history as an equally critical period [as the period from 1895 to 1905]."

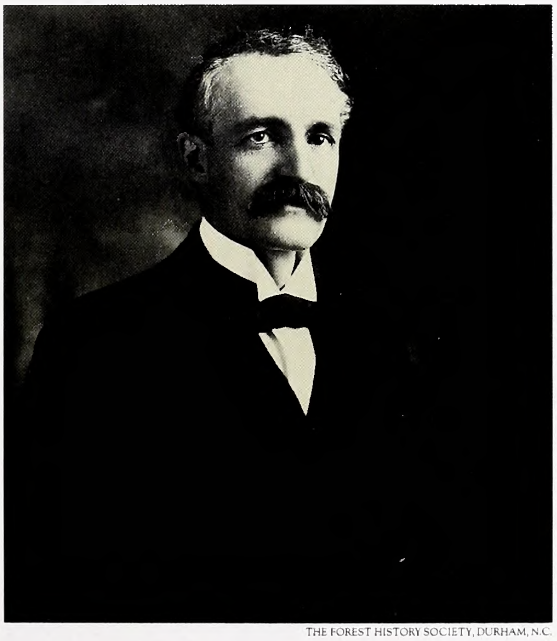
Indeed, like the students at Biltmore a century ago, young foresters of today are poised to change the face of forestry in the early 21st century. They're already doing it. How? With a powerful idea—treating forests sustainably; with a new management philosophy—managing ecosystems; and with a profoundly different attitude—being adaptive and flexible.

Sustainable Forests

If you look for the forest school on the campus of N.C. State University in Raleigh, you'll be directed to Biltmore Hall, a new structure named, of course, after the Biltmore Forest School.

Biltmore Hall is where Dr. Fred Cubbage hangs out, another tall, thin man, although minus the mustache and speaking fluent English, which shouldn't be surprising since he grew up in Iowa.

Cubbage is a co-director of the Southern Center for Sustainable Forests, a newly formed cooperative effort among N.C. State, the N. C. Division of Forest Resources and Duke University (see "New Center Looks Ahead"). He's a good person to talk to about sustainable forests, a term much used in the forestry community these days, and a term that, at least for this visitor, needed a bit of clarification. Cubbage pointed to the definition adopted by the American Forest and Paper Association, a group representing more than 400 forest and paper companies and related organizations. "Sustainable forestry is management of the forests to meet the needs of the present without compromising the ability of future generations to meet their own needs," Cubbage read.



THE FOREST HISTORY SOCIETY, DURHAM, N.C.

It sounded pretty harmless. What was revolutionary about that?

Perhaps not revolutionary, Cubbage explained, but evolutionary. "It's really an expansion of the traditional idea of forest management," he said. "It's an evolution of forestry from producing an individual commodity—timber, say—to producing a whole host of goods and services." Things like fish and wildlife, clean water, clean air and fertile soil. Forest stewardship, in other words.

Cubbage explained that the public is very interested in forests that are managed for many nontimber purposes. "The public cares about having decent water, about taking care of the land in a reasonable fashion," he said. "It cares about having forests for the future, and even forest landowners are very big on protecting the environment. So I think the commonwealth believes that somehow protecting the environment and

***Scientific forestry in** America began at the Biltmore Estate in western North Carolina in the 1890s. Gifford Pinchot (left) managed the forests of George W. Vanderbilt to prove that treating forests as a sustainable resource was profitable. His successor, Carl Schenck, opened the Biltmore Forest School in 1898, the first forestry school in the country. Many of his students (above) went on to hold influential forest-management positions throughout the country. Schenck is in the back row, fifth from the right.*

MELISSA McGAW

KEN TAYLOR

MELISSA McGAW

***The nationwide interest** in sustainable forests is based on the realization that good management can also provide habitat for wildlife (top), watersheds for clean water and clean air as well as timber for human needs (middle and bottom). As southern woodlands become more valuable for timber, these other forest values must be protected.*

sustaining it in reasonable condition is worthwhile."

The question is how to balance this "kinder, gentler" forestry with timber demands that are projected to skyrocket in the next decade. The South is the wood basket of the nation at present; in the next century, it may be the wood basket of the world.

Indeed, southern foresters were so successful at regenerating forests after the ravages of the cut-and-run lumbermen that we have more forested land today than we've had since before the Civil War. Of the 32 million acres of land in North Carolina, almost 20 million are forested. About half the total number of industrial forest plantations in the world are in the southern United States. The South as a whole yields more timber than any other wood-producing country or region in the world, and it will soon be called upon to provide even more. Between 1986 and 2010, timber harvests in the South are expected to increase by nearly 20 percent in softwoods and 60 percent in hardwoods, mostly because of decreased harvests in the Northwest. As forest manufacturing shifts southward, the demand for timber—both pulpwood and sawtimber—will rise.

Thus worldwide economic forces are converging on North Carolina and the rest of the southern timber region. "What that does is put more and more pressure on the forest, just in terms of a single commodity—timber," Cubbage said. "In North Carolina, we can sustain those increased levels of harvest because we've got quite a bit of timber. But in other places in the South, it's not clear whether we can sustain these increased levels."

Increasing timber harvests and widespread urbanization will put the squeeze on some of the other measures of forest sustainability—forests as habitat for wildlife, as watersheds, as recreational opportunities and as beautiful places to be. "It will be harder to sustain the values we have," said Cubbage, "and if we do maintain this level of cutting I think we will reduce the forest inventory. Some people view that as unsustainability."

Producing sustainable forests, thus, is a goal that will be tested perhaps as never before in the new century. It may take another century to know whether we were good forest stewards—whether we were successful in balancing our needs for timber with our needs for water, wildlife habitat and the other things that we value in our forests.

Ecosystem Management

Gary Blank and Douglas Parker picked their way through a forest of loblolly pines and hardwoods, finally halting under a half dozen lofty pines marked with yellow bands.

"Longleaf pine," Blank pointed out for his visitor. "Now where's that cat face?" Parker located it, a century-old turpentine stump with the ax-hewn box still visible at its base. They noted that this woodland was once a transitional type of longleaf pine forest common in the Piedmont, but now, after decades of fire

suppression, overtaken by loblollies and hardwoods.

Blank, a forestry professor at N.C. State University, and Parker, a graduate student in forestry, are engaged in a forest management experiment on 1,225 acres of woodland belonging to Carolina Power & Light Co. at the Shearon Harris nuclear facility in Wake County. The university has a 25-year lease on the land on the northwest side of Harris Lake, and Blank and his students have identified 400 acres that historically belong to the Piedmont type of the longleaf pine ecosystem. CP&L has agreed to work with Blank to restore the area to longleaf pine, through prescribed burning, natural regeneration and plantations.

"Twenty years ago we might have clear-cut this site and planted loblolly pine," Blank said. Instead, Blank and Parker began their management by doing a botanical inventory of the site.

"That's when we found that the soil type here supports longleaf pine," Parker said. "And when we found longleaf on the site, CP&L agreed to restore it."

"Ecosystem management, as I understand it, means that you study the conditions that you've been dealt —past conditions, too—and you use that knowledge to guide your management into the future," Blank said.

Blank's work at CP&L is a good example of ecosystem management, a term, unfortunately, that is a bit murky. When F. Dale Robertson, then chief of the U.S. Forest Service, announced in June 1992 the agency's commitment to an ecological approach in future forest management, he defined it this way: "We must blend the needs of people and environmental values in such a way that the national forests and grasslands represent diverse, healthy, productive and sustainable ecosystems."

Nebulous? You bet. Yet despite the murkiness of the term, by 1998 all federal land management agencies, and land-managing conservation groups like The Nature Conservancy, were hastening to put their lands under the principles of ecosystem management. That's how fast the new concept has come to dominate the ongoing discussion of forestry in America.

What is ecosystem management? The term has spawned a dozen definitions, but what is common to all of them is a widening of the manager's scope. With ecosystem management, the manager looks not merely at the forest but at the larger landscape of which the forest is a part; and not merely at the trees but at the multiple organisms that interrelate to form the working ecosystem.

This approach follows a century of growing knowledge about the complex workings of forested ecosystems —how small, seemingly insignificant organisms perform some of the most critical functions in a forest. For example, in Schenck's time few people knew of the existence of forest mycorrhizae—the invisible partnerships between soil fungi and tree roots that help trees grow quickly and healthily. Some plants, such as legumes, not only are important seed producers for wildlife but also fix nitrogen in the soil. Such knowledge has invigorated management.

"Ecosystem management is a more comprehensive way of looking at forests," said Larry Haden, acting staff officer for ecosystems and planning with the Forest Service in Asheville. "Before ecosystem management, we would look at a 1,000-acre tract, and we'd come up with a project. We just managed sites. Now we start with the ecoregional scale—the southern Appalachians, for example—and then move down to the forest, then to the watershed and finally down to the site level.

"Ten years ago we were looking at forest growth and output. Now we may be looking at restoration projects."

On the Uwharrie National Forest, for example, longleaf pine was recently identified as a degraded ecosystem in need of restoration. The recently completed management plan for a 5,800-acre section of the forest was based on ecosystem management principles. The plan includes provisions for harvesting timber, but they are dwarfed by management provisions for endangered species, old-growth forests, wildlife habitat (travel corridors, songbird nesting, amphibian and terrestrial mollusk habitats), and aquatic species diversity. Under the plan, loblolly pine plantations will be reduced from 2,147 acres to 35, while longleaf will jump from 1,397 acres to 3,477.

Many advocates of ecosystem management believe that even private landowners, who own 76 percent of forest land in North Carolina, must be a part of ecosystem management. "Ecosystem management provides the opportunity to understand how individual tracts fit into a larger landscape," said Forest Service deputy chief Joan Comanor in 1994. A good example of how this works is the longleaf pine ecosystem, which has been identified as one of the most degraded ecosystems in the country. Fewer than 3 million acres of longleaf, out of an original range of 70 to 90 million acres, remain. Foresters have been working throughout the Southeast to encourage private landowners, big and small, to grow longleaf. Financial incentives have been established for longleaf pine growers, and other incentives even reward landowners who maintain the endangered

Following ecosystem *management principles, forest managers study and understand the natural processes that govern their forests. In the Southeast, one common ecosystem process is fire. Forest managers employ fire to improve forest health and reduce hazardous fuel loads.*

KEN TAYLOR

New Center Looks Ahead

Aren't there better ways to bring good forestry techniques to the attention of the thousands of southern forest owners who are struggling to do the right thing?

The Governor's Task Force on Forest Sustainability thought so in 1995 when it recommended the establishment of a new center on sustainable forests at N.C. State University. Established in July 1997, the purpose of The Southern Center for Sustainable Forests is to provide the regional leadership necessary to promote forest management that is ecologically and economically sustainable.

Dr. Frederick W. Cubbage, chairman of the Forestry Department at N.C. State University and one of three center co-directors, says the center will be a cooperative endeavor between the Department of Forestry at N.C. State, the Nicholas School of the Environment at Duke University and the N.C. Division of Forest Resources. Dan Richter of Duke University and Warren Boyette at the state Division of Forest Resources are the other co-directors.

"The center was one of 15 priority recommendations of the governor's Task Force," Cubbage says. "It's based on the premise that there should be a better way to integrate research, education and practice than we have done in the past." Many groups are involved in disseminating forestry information, but they are splintered and the word is not getting out to forest landowners, he says.

Among the functions that the new center would perform are:

- Fostering research on the effects of forest practices on private forests.
- Bringing the practical results of research to the attention of the private landowner.
- Developing guidelines for sustainable forestry practices.

"The center is a way to talk about the tradeoffs that we, as a society, are willing to accept as our population grows and makes more demands on our forests," Cubbage says.

Though the center has been in operation for over a year, it is still seeking funding for a full-time director and researcher, as well as technical staff. A proposal will be made to the North Carolina General Assembly to provide funding for the center in the next legislative session.

WILLIAMS LEA

***A careful shelterwood** cut is a mark of good management.*

red-cockaded woodpeckers in these forests.

"The hook was to identify the region, identify the ecosystem, and then identify landowners or industries and agencies that might participate in its recovery," said Rick Hamilton, an extension forester at N.C. State. "And we've been remarkably successful. We regenerated more acres of longleaf pine last year in North Carolina than in the rest of the Southeast."

Hamilton notes that two of the best vehicles for delivering ecosystem management assistance to the individual landowner are the Forest Stewardship Program and the Stewardship Incentive Program. Stewardship committees exist throughout North Carolina and are providing individual landowners with first-rate guidance and financial assistance in planning their forestry for a variety of goals, including ecosystem restoration and endangered species protection.

Adaptive Management

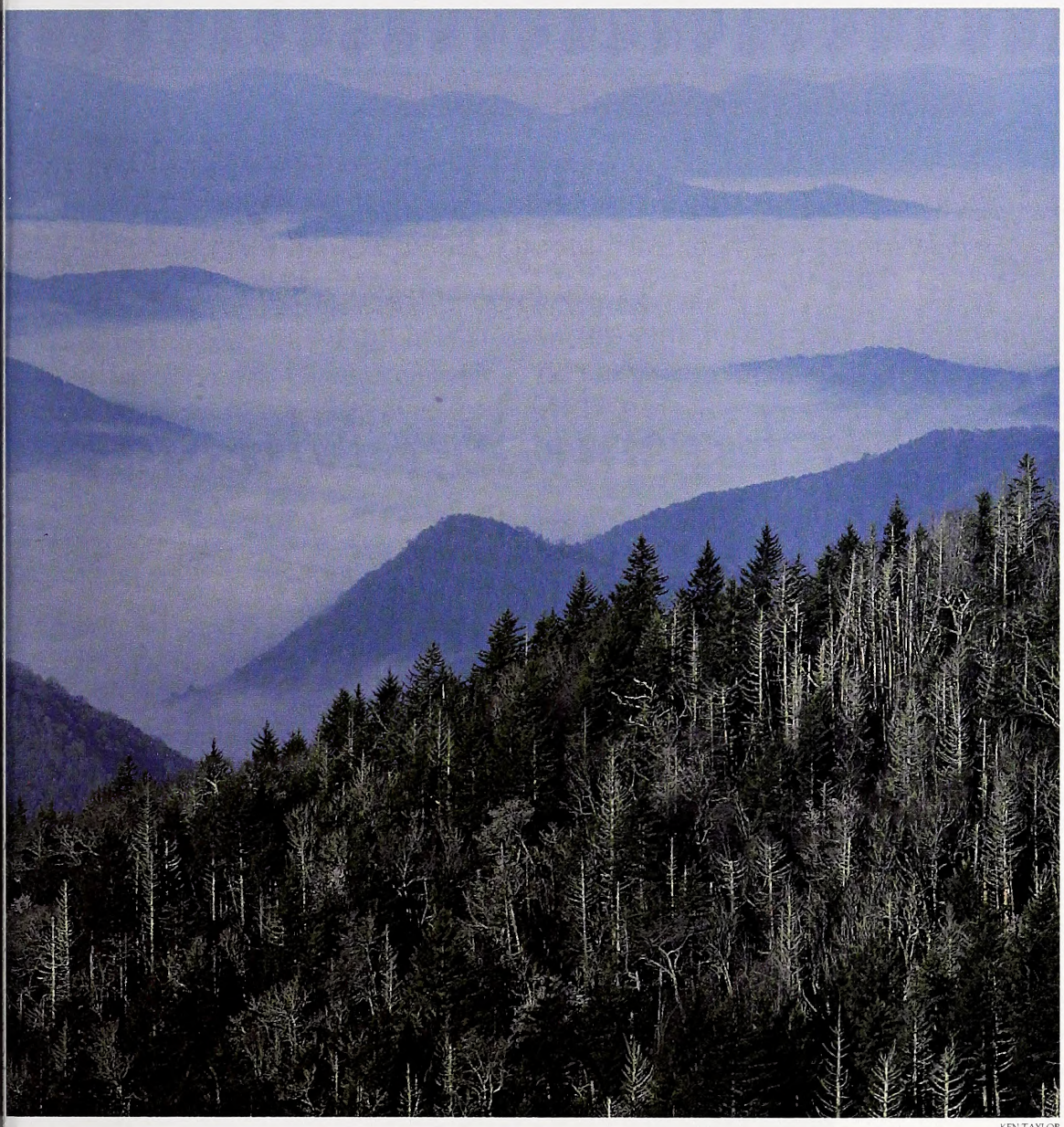
Under ecosystem management, forest managers have to be concerned about how they affect not only the forest but also the organisms that are part of it.

And not only the larger organisms, but also the smaller ones—fungi, insects, salamanders, reptiles, songbirds—that carry on critical functions within a working ecosystem. They have to worry about problems they never had to consider before—habitat specialists, such as the red-cockaded woodpecker; species that require a large home range, such as the black bear; species such as butterflies and moths, whose life histories are often tied to a single plant species. Forest managers increasingly must make sure their management doesn't interfere with a working ecosystem.

But do we possess—will we ever possess—the knowledge that will allow us to manage such complex systems as these? Questions like these have forced some managers to pursue what they call "adaptive management." Adaptive management is not so much a practice as an attitude. It's based on the understanding that forests are complex, and that forest managers cannot always predict the consequences of their management decisions. The best approach, then, is to proceed humbly and with caution. Forest managers are urged to treat any management strategy as experimental, and to monitor it frequently to make sure that things are not going awry.

A notorious example of how easily things can go awry is the idea of fire suppression that was imported from Europe and that guided management in southern forests for decades. The weight of ecological evidence finally proved that periodic fires were not a catastrophe but an essential ecosystem process, especially in the longleaf pine region, but not before fire suppression had led to widespread forest decline. Adaptive management techniques might have prevented such mismanagement.

"Adaptive management is an important part of ecosystem management," said N.C. State's Gary Blank. "When we do something, let's take note of what



KEN TAYLOR

Ecosystem management *means that managers must be aware that their individual forest is a part of the larger landscape (left) and also that the forest consists of thousands of organisms that interrelate to form an ecosystem. Even dead trees play an important role in a forest ecosystem (below), providing habitat for innumerable insects, salamanders, snakes and other animals and plants.*

WILLIAM S. LEA

happens; let's evaluate, let's monitor, let's continue to tinker with the process we're using so we get to where we want to go, understanding how we got there."

Will our forests be better managed under these guiding ideas than the forests of today?

Will our wildlife be more secure, our water cleaner? It's difficult to say. Yet, what is encouraging about these ideas are the attitudes that they represent. A student emerging from a forestry school today knows more about the way forests work than did Pinchot, Schenck or anyone graduating from the Biltmore Forest School in 1900. Yet students of today are likely to look at forests in a humbler way than the great founders of American forestry did, more inclined to learn what the forest can teach rather than impose their wills on the forest. If there has been an advance in forestry, and if that advance provides a new foundation on which future advances will be made, this progress will be based on attitudes like these. ⊠

Special critters are keeping this stream clean. We call them pigtoes, triangle floaters, yellow lances and notched rainbows. Biologists call them unionids (you-nee-ON-ids). They look like rocks and have no heads, so how special can they be? Take a look into this healthy stream; we're

Stalking Our Freshwater Mussels!

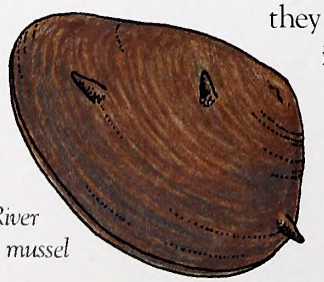
written and illustrated by Consie Powell

WHAT ARE FRESHWATER MUSSELS?

They are **bivalves** that live in streams and rivers. Bivalves (clams, mussels, oysters and scallops), gastropods (snails and slugs) and cephalopods (squids and octopuses) are all soft-bodied invertebrates called mollusks. A bivalve's shell has two hinged parts (**valves**) that protect its soft body. The fleshy **mantle**, a strong foot, various internal organs and muscles and two pairs of thin **gills** complete a bivalve's basic body plan.

Mussels are filter feeders. They open their valves slightly to draw water through an intake hole in the mantle and across their gills. The gills absorb oxygen and catch food particles, which **cilia** move to the mouth. Indigestible particles, such as sand or silt, are expelled with water out an exit hole in the mantle.

Mussels differ from saltwater mussels by not having a **byssal thread** to attach to rocks or pilings. Instead, they burrow partway into the stream or river bottom.



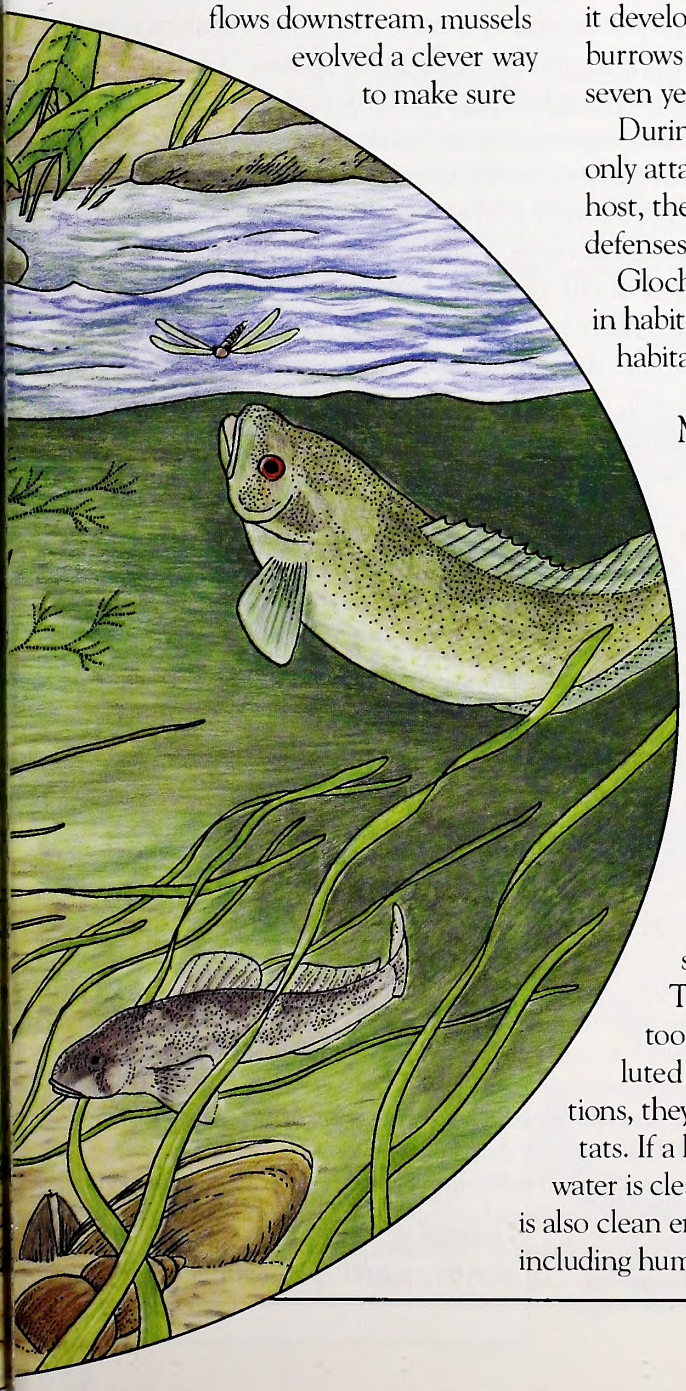
Tar River spiny mussel

The ridges, bumps and spines on shells all help provide stability within the streambottom.

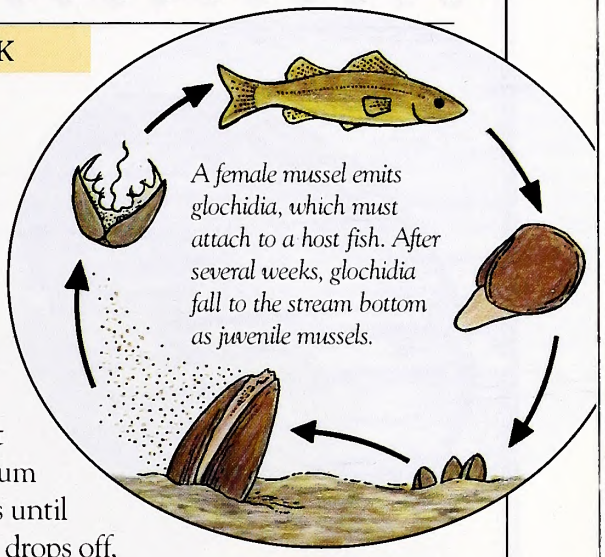
WHAT MAKES MUSSELS SPECIAL?

Freshwater mussels are nature's water purifiers. As they draw water over their gills to breathe and to eat, mussels also filter out silt and undesirable materials. Water downstream from a large bed of mussels is cleaner than the water upstream. Streams with good populations of mussels are healthy streams and support a diversity of other organisms.

Because water in streams always flows downstream, mussels evolved a clever way to make sure their offspring don't wash away. The trick involves fish.



After eggs of female mussels are fertilized they develop into larvae called **glochidia** (glow-KID-ee-uh). If a female released glochidia into the current to wash downstream, they would not develop and would die. A glochidium must **encyst** on a fish's gills or fins until it develops into a juvenile. Then it drops off, burrows into the stream bottom and, over five to seven years, grows into an adult.



A female mussel emits glochidia, which must attach to a host fish. After several weeks, glochidia fall to the stream bottom as juvenile mussels.

During this **parasitic** stage, glochidia of each mussel species can only attach to certain species of fish. If glochidia choose the wrong host, the fish sheds the unwelcomed parasites or its immunological defenses kill the glochidia.

Glochidia are at the mercy of their fish hosts. They usually remain in habitats appropriate for the host, but mussels disperse to new habitats as fish move upstream, downstream or into tributaries.

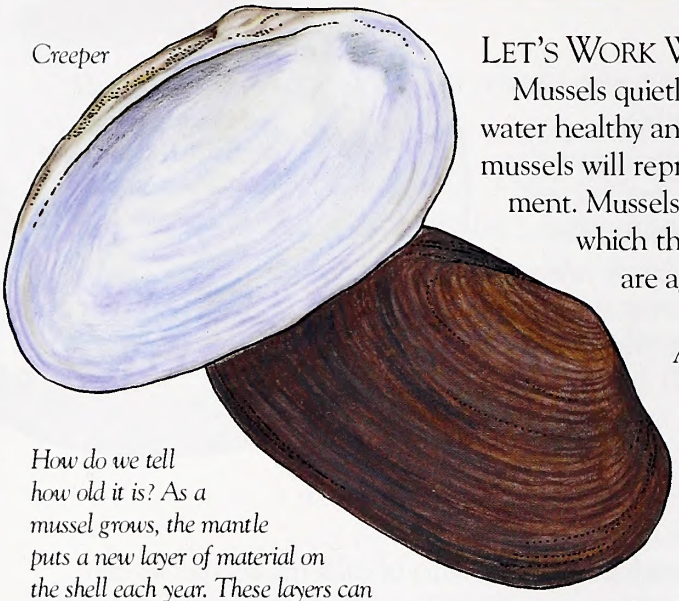
MUSSELS HAVE SOME BIG PROBLEMS

The southeastern United States has the greatest diversity of freshwater bivalves in the world. That's the good news. But there's bad news for mussels, too. During the past century, many species of mussels have gone extinct, and many more have become endangered, primarily from human activities.

Tree clearing, development and agriculture have caused rivers and streams to become excessively silted. Low oxygen levels and toxic chemicals also kill mussels. But one of the greatest causes for their demise has been the change in their habitat caused by damming rivers. Most mussels are adapted to clear flowing streams and rivers with **riffles**. Dams eliminate riffles, reduce oxygen in the water and allow silt that was once carried away by currents to settle on the mussels.

Their loss is a serious matter and affects us, too. Because mussels depend on unpolluted water and healthy host fish populations, they indicate the health of habitats. If a habitat is healthy enough and water is clean enough for mussels, then it is also clean enough for other organisms, including humans.

Yellow lance



Creeper

How do we tell how old it is? As a mussel grows, the mantle puts a new layer of material on the shell each year. These layers can be counted, just like one would count the annual growth rings of a tree.

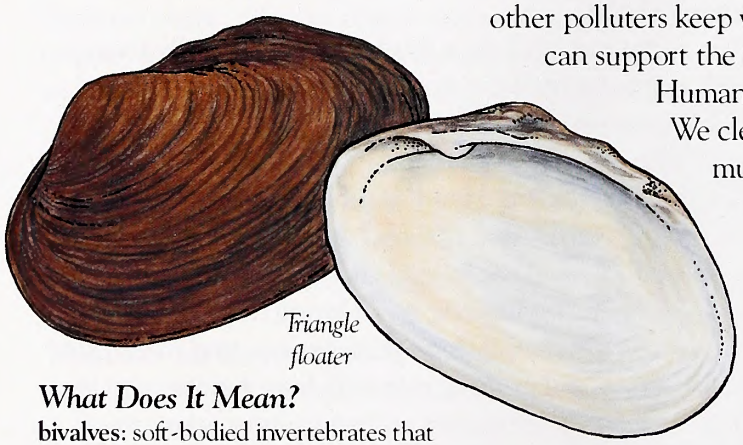
LET'S WORK WITH THE MUSSELS

Mussels quietly and steadily work at their job—keeping water healthy and clean. Fish hosts, other aquatic critters and mussels will reproduce and thrive if given a clean environment. Mussels can even recolonize rivers and streams from which they have been exterminated, once such waters are again healthy and unpolluted by waste or silt.

What can people do to help them? First of all, think big. A small stretch of stream may be a safe place for some mussels, but unless the whole stream and its surrounding habitat are healthy, a mussel population will probably be in trouble. Second, think habitat and variety. A stream healthy enough for mussels is a good home for many species of fish and other aquatic critters, and will attract birds and other wild animals.

People can improve stream habitat. Farmers, foresters and other citizens can make sure that streams have a wooded buffer zone at least 250 feet wide to absorb runoff. Citizens can insist that factories and other polluters keep wastes out of rivers. We can avoid building new dams and can support the removal of old, obsolete dams.

Humans can strike a pretty fair trade with these lowly mussels. We clean up the rivers and make them liveable again, and the mussels will, hopefully, recolonize, thrive and make the stream water even cleaner.



Triangle floater

What Does It Mean?

bivalves: soft-bodied invertebrates that have two parts to their shells

valves: the two distinct and moveable parts of a mussel, clam, oyster or scallop shell

mantle: the part of the body wall of a mollusk that lines the shell and secretes shell-building material

gills: the organs that obtain oxygen from the water

cilia: microscopic hair-like projections on certain internal organs that beat with others in coordinated waves

byssal thread: long, tough filament by which some bivalve mollusks attach themselve to objects

glochidia (singular: glochidium): the larvae of freshwater bivalves of the family Unionidae

encyst: to form or become enclosed in a small capsule or cover

parasitic: dependence of one organism on another without the first contributing to the well-being or survival of the second

riffles: small waves or broken water

Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon. Special thanks to manuscript consultants John Alderman and Arthur Bogan.

Read and Find Out

- *The Freshwater Mussels of Tennessee* by Paul W. Parmalee and Arthur E. Bogan, University of Tennessee Press, 1998.

In *Wildlife in North Carolina*:

- "Declaration of Interdependence" by Lawrence S. Earley, June 1998.
- "Of Spinys and Spotfins" by John Alderman, March 1989.

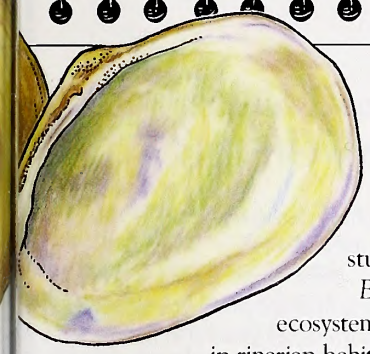
Get Outside

Visit a stream: Would a stream near you be a good home for mussels? Don't dig in the bottom to find out: look for other clues instead. How much wooded land lines the stream? Are various plants growing in and along the water. What critters do you see? Is the water clear? Does the stream have riffles?

Look in great-grandma's button jar: Have you seen antique dresses or shirts with genuine mother-of-pearl buttons? Those buttons are treasures; they probably came from Midwest lake or river freshwater mussels during the "button boom" at the turn of the century.

Visit the North Carolina Museum of Natural Sciences, Raleigh: Stop by the Museum's Mollusk Exploration Station, located in the Freshwater Wetlands exhibit on the second floor. Examine and touch live mussels and learn about their relatives. Tuesday mornings in November. All programs are free. For more information, call (919) 733-7450.

North Carolina WILD Notebook



Yellow lampmussel

It's WILD!

Project WILD activities for teachers and students that correlate to this topic include:

Blue Ribbon Niche: teaches students about riparian ecosystems and to evaluate potential effects from changes in riparian habitats.

Deadly Waters: teaches students about kinds of pollution that can affect water and the animals and plants that live in it.

To Dam or Not To Dam: teaches students effects of dam construction on a river.

Water Canaries: teaches students to identify several aquatic organisms and to assess environmental quality of a stream.

Get WILD

Have you visited a N.C. WILD Education Site? There are over 20 sites around the state that provide educational partnerships within communities as well as valuable habitat for local and migrating wildlife. New sites are developed through an application selection process that follows a presentation to interested parties by education specialists at the Division of Conservation Education. If interested in a presentation, contact N.C. WILD, Division of Conservation Education, N.C. Wildlife Resources Commission, (919) 733-7123 Ext. 261.

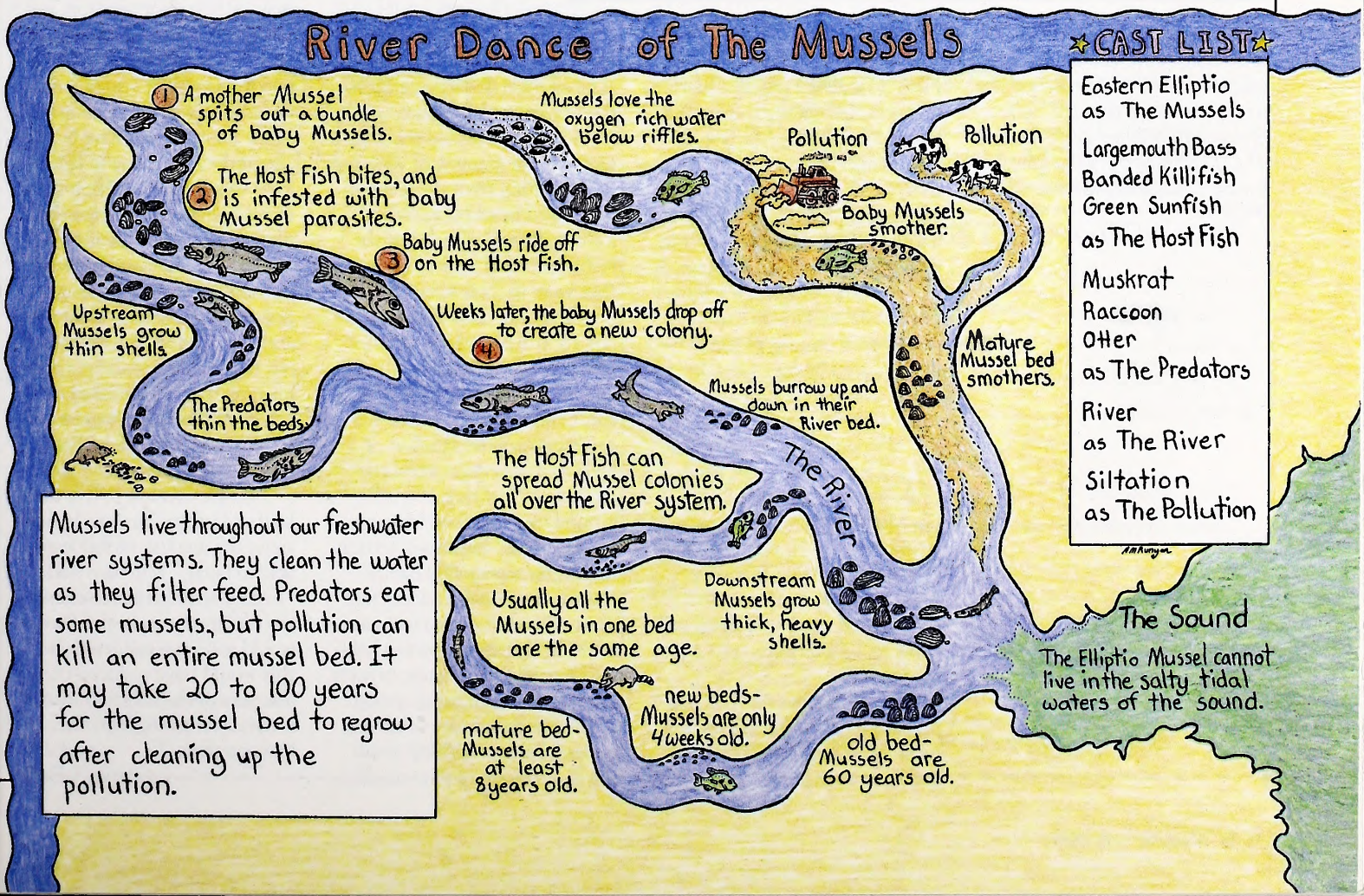
Feb. 26-27—*Salamanders: To Know Them Is to Save Them.* Advanced N.C. WILD workshop for educators. Donna Rogers. (919) 541-5478.

Mussels fool fish!

Some species have a part of the mantle that looks like a minnow, right down to an eyespot and lateral line. When a fish tries to grab the "minnow" it gets a squirt of glochidia instead.

Some species make a gelatinous "minnow" that dangles on a string of mucus. When a fish bites the "bait" it gets a mouthful of glochidia.

Others produce tasty-looking gelatinous packages of glochidia that look just like larval fish, midge larvae, roundworms or fish eggs.



Summer Wildfires in Florida Being Studied by N.C. Forestry Officials

KEN TAYLOR

***By studying the** recent wildfires in Florida, North Carolina forestry officials hope to prevent scenes such as the one shown above of Holly Shelter. In 1986, fire swept through 45,000 acres of this game land, leaving a blackened wasteland.*

Edited by Chris Powell

Between May and July of last summer 2,200 wildfires in Florida scorched nearly a half million acres, killing three people and destroying nearly 400 homes and businesses. More than $100 million was reportedly spent to fight the fires, and another $750 million was lost in damages and tourism revenue.

One other statistic is telling: of the 80 fires Florida experienced each day, 90 percent were caused by lightning. It seems that nature had a lot to do with the devastation.

"We need to remember that fire is a natural process, especially in the Southeast," said Jim Murriam, director of stewardship for the Florida chapter of The Nature Conservancy. The chapter sent 15 people to fight the fires, spending close to 1,000 hours on the wildfires.

Could wildfires like this happen in North Carolina? Yes, say most forest experts. They have and they will again.

"Over the past few years, we've had a heavy accumulation of forest litter following the four or five hurricanes we've had," said Derryl Walden, deputy director of the N.C. Division of Forest Reources. "There's a tremendous amount of fuel (vegetative debris) on the ground. We need to eliminate this."

In North Carolina's Coastal Plain, plants burn easily because they are loaded with flammable chemical compounds. The plant species have assured their survival by adapting to fire, dropping their seeds in the fertile ashes or reproducing through underground organs untouched by fire. These adaptations have assured their dominance across the fire-prone landscape.

What was unusual this summer was the amount of vegetation resulting from the wet winter caused by El Nino. When a spring drought dried out the lush vegetation, officials knew they were in for a long summer.

"The only condition we have any control over is the amount of fuel available to burn when ignited," Murriam said. "We can't control the weather. We can't control the ignition of fuels. But we can control the amount of fuel that is on the ground by prescribed burning."

Prescribed burning—setting fires under controlled circumstances—not only reduces fuel in woodlands, but also maintains forest health and improves habitat for wildlife. Yet, forest experts say we are not burning enough in the Southeast (see "Burning Issues," February 1998), resulting in a buildup of pine needles, plant remains and other flammable debris.

All too often, what is preventing fires are problems associated with development in fire-prone woodland areas. People moving into these areas are often unsympathetic to the necessity of controlled burning. In some areas, homeowners have sued, complaining about smoke and other inconveniences associated with fire. As a result, landowners won't burn because they are afraid of possible litigation.

"The public has a responsibility," Murriam said. "It's not realistic to try to exclude fire from the landscape. In prescribed burning the fire manager can direct smoke away from smoke-sensitive areas, whereas in a wildfire you have to take the hand you're dealt."

In Florida, there have been many lessons learned from last summer's catastrophic blazes. More training for firefighters is needed as well as equipment appropriate for fighting wildfires. Many homeowners have learned that if they are going to live in areas that are susceptible to burning, they have to develop a defensible space around their homes.

Indeed, Murriam said state officials are already looking at proactive solutions—identifying and targeting areas with hazardous fuel build-ups, and control burning them before they fuel other wildfires. The biggest lesson learned, he said, is that fuels need to be managed.

"People can live in the wildland and urban interface by managing the amount of fuel available to burn," Murriam said. "Even if all lands were control burned in the past, the fires would still have occurred. But this would have reduced the intensity of the fires and made it easier for firefighters to manage them."

—Lawrence S. Earley

Rabid Deer Found Near Surry-Wilkes County Line

The discovery of a rabid deer this past summer has prompted state wildlife and health officials to urge hunters to be particularly careful while dressing deer harvested this hunting season.

The white-tailed deer was found north of Elkin near the Surry–Wilkes County line and confirmed rabid in August by the state Laboratory of Public Health. While rabies has been confirmed in raccoon and fox populations in North Carolina, it was the first documented case of a rabid deer since 1955, said Dr. Lee Hunter, of the epidemiology section of the N.C. Department of Health and Human Services.

David Sawyer, a wildlife biologist who investigated the incident, said there is no cause for alarm; however, rabies can infect any mammal, and hunters should be wary of deer acting abnormally. "Abnormal behaviors include having uncoordinated movements or paralysis, being overly tame, unaware of human activity or being aggressive," Sawyer said.

There are no known cases of hunters contracting rabies by dressing deer. Still hunters would be well advised to take some precautions during the process, Hunter said.

"A prudent hunter should use rubber gloves, and since the rabies virus is present in high amounts in the brain, spinal cord and salivary glands of an infected animal, particular care should be taken with these tissues," Hunter said. "It is just good sanitary practice to wash any potentially contaminated clothing in hot water and disinfect gloves and utensils by soaking them in detergent or in a solution of 1 part household bleach to 10 parts water for about 20 minutes."

—*Bodie McDowell*

Field Notes

Central Bow and Arrow Deer	Through Nov. 7
Northwestern Bow and Arrow Deer	Through Nov. 14
Western Bow and Arrow Deer	Through Nov. 21
Central Muzzle-loading Deer	Nov. 9-14
Northwestern Muzzle-loading Deer	Nov. 16-21
Eastern Gun Deer	Through Jan. 1
Central Gun Deer	Nov. 16-Jan. 1
Western Gun Deer	Nov. 23-Dec. 12
Northwestern Gun Deer	Nov. 23-Dec. 12
Black Bear	See *Regulations Digest*
Wild Boar	Through Nov. 21 and Dec. 14-Jan. 1
Gray Squirrel	Through Jan. 30
Fox Squirrel	See *Regulations Digest*
Fox	See *Regulations Digest*
Raccoon and Opossum	See *Regulations Digest*
Ruffed Grouse	Through Feb. 27
Mourning Doves	Nov. 23-28 and Dec. 19-Jan. 14
Rails, Gallinules and Moorhens	Through Nov. 13
Crow	See *Regulations Digest*
Bobcat	See *Regulations Digest*

The 1999 North Carolina Wildlife Calendar Is Here!

James A. Brook's "November Light" is one of 12 fine paintings featured in the 1999 North Carolina Wildlife Calendar. Order now before they're sold out.

The works of Mark P. Slawson, James A. Brooks, Robert B. Dance, Dempsey Essick, Duane Raver, Raney G. Rogers, David Williams, Robert C. Flowers Jr., Brian Edwards and Joe Seme are featured in the 1999 North Carolina Wildlife Calendar.

Order yours today! Payment must accompany your order. Calendar orders may be charged to VISA or MasterCard, or enclose your check or money order (payable to NCWRC). Complete the form below and mail with payment to:

1998 Calendar, N.C. Wildlife Resources Commission
512 N. Salisbury Street, Raleigh, N.C. 27604-1188
(Office is located at 322 Chapanoke Road in Raleigh.)

GREAT CHRISTMAS GIFT!

Please send me _____ calendars at $6.00 each . . . . . .$_____

All N.C. residents add $.36 sales tax per calendar . . . . . _____

☐ Enclosed is my check for **total** payment of . . . . . .$_____

☐ Charge to MasterCard or VISA for the calendar(s) ordered above. My card number is _____ and the expiration date is _____/_____.

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Card holder signature | Day Time Phone No.

If ordering 7 or more calendars, please provide your UPS deliverable address.

Name _____

Address _____

City/State/Zip_____

Phone (_____) _____

All orders must be prepaid. A $20 charge will be made on returned checks (N.C.G.S. 25-3-512). **For fund raising and bulk rate information (10 calendars or more), call 919-662-4377. Please allow 6 weeks for delivery.**

CAL099

N.C. Hunters for the Hungry Set for the Hunting Season

With deer season underway, the N.C. Hunters for the Hungry program is hoping for another record year of donated venison. Last year, deer hunters statewide donated about 40,000 pounds of venison (the highest year to date) to feed the needy through the program. That brings the overall total since the non-profit group started five years ago to more than 125,000 pounds.

Donated deer are processed into ground venison and distributed to homeless shelters, soup kitchens and food banks across the state. Each deer, served in pasta dishes and soup, can feed about 120 people.

Donated deer must be harvested, tagged and reported in accordance with the N.C. Wildlife Resources Commission regulations. The program also accepts deer legally harvested in other states. Below is a list of participating meat processors as of the end of July.

Bladen County
Clarkton Processing Co.
Railroad St.
P.O. Box 543
Clarkton, N.C. 28433
(910) 647-8191
Mon. - Fri., 8 a.m. - 5 p.m.

Cumberland County
Super K Wholesale Meats
105 S. Broad St.
Fayetteville, N.C. 28301
(910) 483-1777
Mon. - Fri., 8 a.m. - 5 p.m.

Davidson County
Midway Meats Inc.
3282 Clodfelter Road
Winston-Salem, N.C. 27107
(336) 764-2684
Mon. - Fri., 8 a.m. - 5 p.m.

Franklin County
Pearce's Custom Processing
Perdue's Road (S.R. 1430)
Louisburg, N.C. 27549
(919) 496-3152
Mon. - Sat., 10 a.m. - 10 p.m.;
(check station, will skin deer)

Guilford County
M. R. Griffin & Son
Highway 65
(8041 Belews Creek Road)
Stokesdale, N.C. 27357
(336) 643-4524
Mon. - Sat., 8 a.m. - 6 p.m.;
Sun., 8:30 a.m - noon
After hours, call (910) 643-5933

Ernie Shue
8123 Lariat Drive
Summerfield, N.C. 27358
(336) 643-1060
Please call first
(drop-off site, field-dressed deer with skin on)

Henderson County
Henderson's Meat Market
911 Staton Road
Flat Rock, N.C. 28731
(828) 692-4553
Mon. - Sat., 8 a.m. - 5 p.m.

Iredell County
WhitCor Farms Inc.
219 Lippard Farm Road
Statesville, N.C. 28625
Mon. - Sun., 7 a.m. - 5 p.m.
After hours call (704) 872-4869
(check station, will skin deer)

Johnston County
Custom Meat Processing
963 Old Johnson Road
Wendell, N.C. 27591
(919) 365-9406
Open 7 days a week
Sun., 2 p.m. - 5 p.m.
Call for directions
(check station)

Jones County
Riverside Meat Inc.
504 Landfill Road
Trenton, N.C. 28585
(252) 448-4047
Mon. - Thurs., 7 a.m. - 5 p.m.;
Fri., 7 a.m. - 6 p.m.

Lee County
O'Connell's Super Market
109 E. Main St.
Sanford, N.C. 27330
(919) 776-2412
Mon. - Thurs., 8 a.m. - 7 p.m.;
Fri., 8 a.m. - 8 p.m.;
Sat., 8 a.m. - 7 p.m.
Sun., 1 p.m. - 6 p.m.

Onslow County
Community Meat Center
1710 Piney Green Road
Jacksonville, N.C. 28546
(910) 353-4676
Mon. - Sat., 9 a.m. - 7 p.m.

Pender County
Clark's Sausage & Pork Outlet
4800 N.C. Hwy. 133
Rocky Point, N.C. 28457
(910) 675-0358
Mon. - Sat., 6 a.m. - 8 p.m.;
Sun., noon - 6 p.m.

Wells Pork Products
750 Croomsbridge Road
Burgaw, N.C. 28425
(910) 259-2523
Mon. - Fri., 7:30 a.m. - 5:30 p.m.; Sat., 6:30 a.m. - 4 p.m.

Perquimans County
Layden Meats
Highway 37
Belvidere, N.C. 27919
(252) 297-2191
Mon. - Fri., 8 a.m. - 4 p.m.

Pitt County
Bonham Meats
100 Pollard St.
Greenville, N.C. 27834
(252) 758-2277
Mon., Tues., Thurs. & Fri., 9 a.m. - 6 p.m.
Wed. & Sat., 9 a.m. - 5 p.m.

Rockingham County
Richards Meats & Things
1403 S. Scales St.
Reidsville, N.C. 27320
(336) 342-1881
Mon. - Sat., 8 a.m. - 6 p.m.

Sampson County
Andy Powell
5694 Taylor's Bridge Hwy.
Clinton, N.C. 28328
(910) 592-8495
Please call first
(drop-off site)

Stanly County
Thompson & Son
1718 Blanch St.
Albemarle, N.C. 28001
(704) 982-6946
(704) 982-1298 (home)
Mon. - Fri., 8 a.m. - 5 p.m.
After hours, call home number.

Union County
Frontier Meats
8303 Lancaster Highway
Waxhaw, N.C. 28173
(704) 843-3921
Mon. - Fri., 7 a.m. - 5 p.m.;
Sat., 7 a.m. - 4 p.m.
(check station)

Wake County
Country Corner Grocery
604 Jones Dairy Road
Wake Forest, N.C. 27587
(919) 556-8300
Mon. - Sat., 7 a.m. - 9:30 p.m.;
Sun., 8 a.m. - 6 p.m.

Additional processors will likely be added by hunting season. For an updated list or for more information on how to participate in the program, contact N.C. Hunters for the Hungry, P.O. Box 10502, Raleigh, N.C. 27605-0502, or call (919) 557-8090.

NORTH CAROLINA HUNTERS FOR THE HUNGRY

Taking Aim Against Hunger

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

Nov. 3-5

The Pisgah Center for Wildlife Education will hold a hunters education course 6 p.m. to 9 p.m. This program is designed to promote the safe handling of firearms and archery equipment, to teach responsibility and ethical conduct and to explain the importance of wildlife management laws and regulations. For more information, call (828) 877-4423.

Nov. 5-7

Bertie County Schools' Academic Booster Club will sponsor "Bucks for Bertie," an annual deer hunt to raise money for school improvements and scholarships. For $300, hunters are treated to 2½ days of guided deer hunting on about 40,000 acres of prime hunting land. Local landowners, guides and volunteers serve as hosts. Other events include a cookout and a turkey shoot. The program has raised more than $140,000 to help buy computers for local schools and establish a scholarship fund. For information, call Bertie County Schools Assistant Superintendent, Glenwood Mitchell, at (252) 794-3173 Ext. 141.

Nov. 21

The Pisgah Center for Wildlife Education will conduct a tree-identification class from 1:30 to 4:30 p.m. Participants will learn about trees and how important they are to people and wildlife. Participants will learn the basics of identifying trees by their twigs, leaves and buds. For more information, call (828) 877-4423.

1998-99 Waterfowl Bag Limits, Shooting Hours and Season Dates for Waterfowl

See the current *North Carolina Inland Fishing, Hunting & Trapping Regulations Digest* for other regulations concerning waterfowl.

BAG LIMITS

Conventional bag: Six ducks daily with no more than one black duck (black duck season closed until Dec. 1), four mallards with no more than two hens, two wood ducks, two redheads, four scaup, one fulvous tree duck, one mottled duck, one canvasback or one pintail. There will be no season for harlequin ducks.

Other limits: a) 15 snow geese and blue geese
b) 2 brant
c) 5 mergansers (one may be a hooded merganser)
d) 7 sea ducks (4 scoters) in special sea duck areas only
e) 15 coots
f) 2 Canada geese during regular season

SHOOTING HOURS

One-half hour before sunrise to sunset

SEASONS

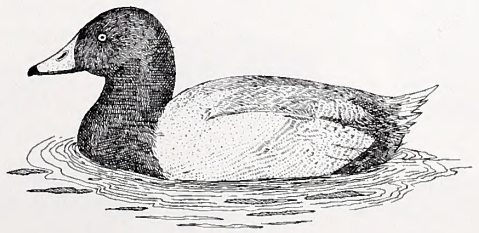
Ducks, Mergansers and Coots: Nov. 16 through Jan. 20

Sea Ducks: Through Jan. 20

Snow and Blue Geese: Nov. 16 through March 10

Brant: Nov. 24 through Jan. 20

Swan: Through Jan. 30 (by permit only)



Canada Geese: Oct. 1 through Nov. 15, except in Bertie, Camden, Currituck, Chowan, Dare, Hyde, Pasquotank, Perquimans, Tyrrel Washington and Northampton counties.

Special Youth Waterfowl Hunt Day: Jan. 23; Youths age 15 and under may hunt when accompanied by a properly licensed, non-hunting adult age 21 or over. Species include ducks, mergansers and coots.

You may also call 1 (800) 675-0263 for this information. Report all bands by calling 1 (800) 327-BAND

Looking for a Few Good Conservationists

Do you know a North Carolina conservation hero? Nominations for the 1998 Governor's Conservation Achievement Awards are now open.

Each year the N.C. Wildlife Federation presents this prestigious program to honor those individuals, government bodies, associations and others who have exhibited an unwavering commitment to conservation in North Carolina. There are 15 categories including Youth Conservationist of the Year, Wildlife Conservationist of the Year and Industrial/Municipal Conservationist of the Year. These awards are presented at the Governor's Conservation Achievement Awards banquet every February. Each winner receives a handsome statuette, certificate and the knowledge that their efforts on behalf of conservation have been noticed and applauded.

By recognizing, publicizing and honoring these conservation leaders, the N.C. Wildlife Federation hopes to inspire all North Carolinians to take a more active role in protecting the natural resources of our state.

Deadline for nominations is Dec. 11. For more information and a nomination form, contact the Wildlife Federation at 1 (800) 264-6293.

—Eddie Nickens

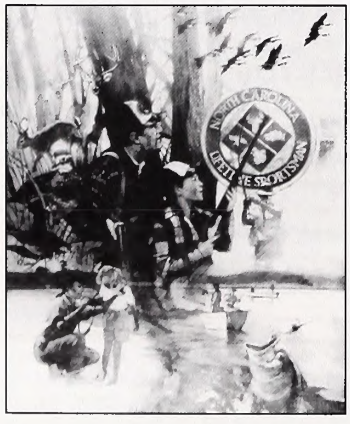
Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report



Totals Through August 1998

Principal Balance
$26,230,992.16

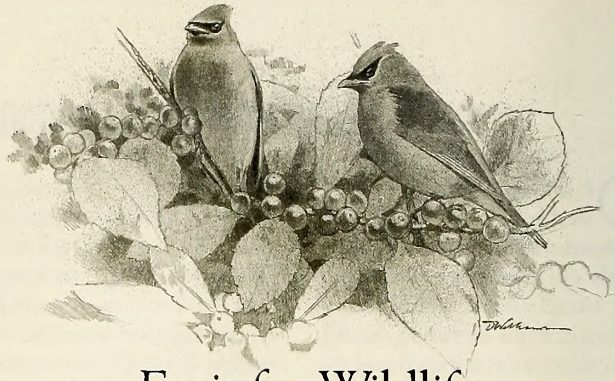
Interest Earned
$26,175,294.08

Total Receipts
$52,406,286.24

Interest Used
$15,250,446.04

Fund Balance
$37,155,840.20

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



Fruit for Wildlife

by Rodney Foushee

With the arrival of pleasant days and cool nights, now is a perfect time to begin planting dormant fruiting trees and shrubs on your land to provide wildlife food and shelter for years to come.

By planting trees and shrubs in the fall, you give their roots time to establish before the brunt of winter arrives. Then when spring arrives, these plants will be in good condition for early growth.

Some of the best choices for wildlife plantings are apples, dogwoods, crabapples, hollies, cherries, mulberries and grapes. Oaks, pecans and other nut trees also provide an excellent source of fat and protein for many species including deer, turkeys, bears, squirrels and songbirds. By planting a variety of trees and shrubs with different fruiting periods on your land, you can provide a nearly year-round smorgasbord for wildlife.

For a free list of sources of wildlife planting materials, call the Wildlife Commission's Division of Wildlife Management at (919) 733-7291.

Duck Boxes: November is an excellent month to put up new wood duck nest boxes and to clean out existing boxes. Boxes should be placed at least 5 feet above the water and tilted slightly forward to allow ducklings to escape easily. A cone-shaped metal predator guard is helpful to keep raccoons and snakes from eating the eggs. Since wood duck pairs start searching for nesting sites in the winter, all new boxes should be in place by the end of the year.

Now is also a fine time to remove old nesting material, eggshells, insect nests and other debris from existing duck boxes. Fresh wood shavings should be added and all repairs completed before January to avoid interfering with nesting.

Pond Drawdowns: Reducing the surface area of a farm pond by one-third to one-half in winter will control the growth of many submerged aquatic plants by exposing them to air and freezing conditions. Drain ponds during the middle of November and keep them low until the beginning of March. Besides keeping weeds under control, a winter drawdown can improve the balance of your pond's fish population by forcing bluegills out of cover where they can be more easily eaten by bass. Otherwise, the highly reproductive bluegills can eventually overrun a pond.

N.C. WILD STORE

NEW!

Introducing the first poster in our "Sporting Heritage" series...

WATERFOWL DECOYS OF NORTH CAROLINA

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting are collected for the first time. This heavy-stock, framable poster is destined to become a collector's item. From private collections throughout the state, the artistic hand-carved decoys brilliantly evoke the days when waterfowl blackened the skies over eastern North Carolina. $10.

ITEM CODE **P12**

★★★★★★★★★★★

Other new items shown on page 38:

*Check out the latest in our colorful and informative nature posters—"**Frogs of North Carolina.**"*

Add to your wardrobe with two new styles of **Wildlife in North Carolina caps***—choose from camouflage and blaze orange.*

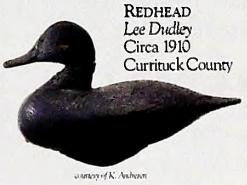
North Carolina's Heritage Sporting

WATERFOWL DECOYS of NORTH CAROLINA

In the legendary days of waterfowl hunting, the ducks, geese and swans migrated by the hundreds of thousands into Currituck Sound, Pamlico Sound, Lake Mattamuskeet, Core Sound and other large waters of eastern North Carolina. In these isolated areas, an illustrious group of decoy carvers arose, their common bond a love of waterfowling and its heritage. In the first poster of the "Sporting Heritage" series, *Wildlife in North Carolina* magazine presents 19 of the state's most famous decoys.

SCAUP
Robert Pigott
Circa 1915
Carteret County

CANVASBACK
Ivey Stevens
Circa 1910
Currituck County

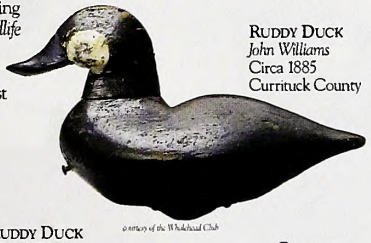


REDHEAD
Lee Dudley
Circa 1910
Currituck County

courtesy of the Whalehead Club

courtesy of K. Anderson

courtesy of K. Anderson



RUDDY DUCK
John Williams
Circa 1885
Currituck County

courtesy of the Whalehead Club

CANVASBACK
Bob Morse
Circa 1938
Currituck County

courtesy of K. Anderson

BRANT
Mitchell Fulcher
Circa 1910
Carteret County

courtesy of K. Anderson

SWAN
Mamie Haywood
Circa 1940
Dare County

courtesy of K. Anderson

RUDDY DUCK
Alvirah Wright
Circa 1900
Dare County

courtesy of the Whalehead Club

BRANT
Charles W. Garrish
Circa 1900
Hyde County

courtesy of K. Anderson

GOOSE
Gary Bragg
Circa 1915
Hyde County

courtesy of the Whalehead Club

REDHEAD
Elmer Salter
Circa 1930
Carteret County

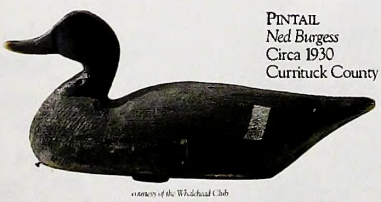
courtesy of the Whalehead Club

CANVASBACK
Ned Burgess
Circa 1935
Currituck County

courtesy of the Whalehead Club

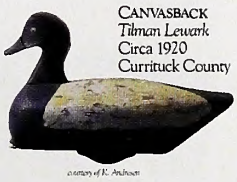
SCAUP
Rufus Roberts
Circa 1930
Currituck County

courtesy of the Whalehead Club



PINTAIL
Ned Burgess
Circa 1930
Currituck County

courtesy of the Whalehead Club



CANVASBACK
Tilman Lewark
Circa 1920
Currituck County

courtesy of K. Anderson

COOT
Ellie Saunders
Circa 1930
Currituck County

courtesy of the Whalehead Club

SWAN
Percy Carawan
Circa 1938
Hyde County

courtesy of the Whalehead Club

WIDGEON
Wallace O'Neal
Circa 1935
Currituck County

courtesy of the Whalehead Club

CANVASBACK
Alvirah Wright
Circa 1906
Dare County

courtesy of the Whalehead Club

Editor: Neal Conoley
Photography: Melanie McGaw
Designed and published by: Division of Conservation Education, N.C. Wildlife Resources Commission

PRESERVING OUR SPORTING TRADITIONS

More terrific items ☛

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

White, 100% cotton (preshrunk) T-shirts are guaranteed for comfort and durability. Each shirt features an original design.

N.C. WILD T-SHIRT
N.C. WILD logo printed on front and colorful art on back. $14.50.
ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE IN N.C. T-SHIRT
WINC magazine logo on front pocket. Tundra swan art on back. $14.50.
ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD CAP
N.C. WILD logo is embroidered on a pro-shape, brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. $16.50.
ITEM CODE **A1**

WILDLIFE IN N.C. CAP
Brook trout and magazine logo are embroidered on a sage-colored, premium weight, pigment-dyed, brushed cotton cap with an unstructured front, an extended bill, and a nubuck suede closure. $16.50. ITEM CODE **A3**

WILDLIFE IN N.C. CAPS
Each embroidered with magazine logo and buck deer silhouette. Described left to right. **$16.50 each.**

Blaze orange with brown waxcloth bill. ITEM CODE **A7**

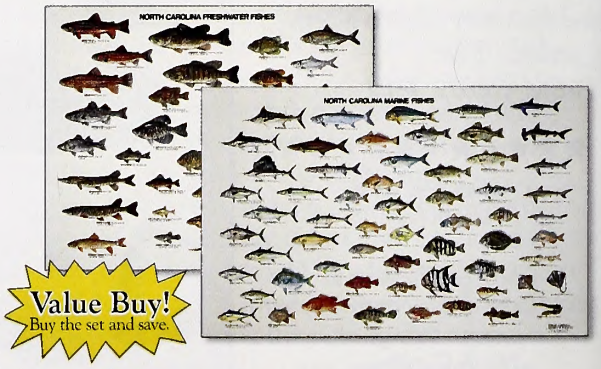
Advantage® Camouflage with tan suede bill. ITEM CODE **A6**

While supplies last! Stone with navy canvas bill. ITEM CODE **A2**

FROGS OF N.C. (THE HYLIDS)
Presents all 15 of the state's tree frogs, cricket frogs and chorus frogs. 22" x 34". $6. ITEM CODE **P11**

LIZARDS OF N.C.
12 of the state's lizard species. 22" x 34". $6. ITEM CODE **P3**

TURTLES OF N.C.
21 of the state's turtle species. 22" x 34". $6. ITEM CODE **P4**



N.C. FRESHWATER FISHES
Find your favorite fish with this color poster showing 36 of the state's freshwater fishes. 28" x 22½". $6. ITEM CODE **P6**

SNAKES OF N.C. (LIVEBEARERS)
17 of the state's snake species. 22" x 34". $6. ITEM CODE **P5**

SNAKES OF N.C. (EGGLAYERS)
19 of the state's snake species. 22" x 34". $6. ITEM CODE **P8**

N.C. MARINE FISHES
All the colors of the sea can be found on this poster of 60 marine fishes. 35" x 22½". $6. ITEM CODE **P7**

SET OF 4 POSTERS
Save $6 by purchasing the set of four posters (**P3-P8**). $18.
ITEM CODE **P10**

N.C. FRESHWATER AND MARINE FISHES
Save $2 when you buy both posters as a set. $10. ITEM CODE **P9**

Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50. ITEM CODE M9

Also available as a boxed set. $30. ITEM CODE M10

North Carolina WILD Places Map

Artist's Proof. $40. ITEM CODE E2
Limited Edition. $25. ITEM CODE E3
Poster. $6. ITEM CODE E4

North Carolina WILD Places Posters

(Set of 3): Posters of "Old Field" and "Mountain Cove Forest" from *North Carolina WILD Places: A Closer Look*. 19 1/2" x 16". Shipped folded with poster version of WILD Places Map. $8. ITEM CODE E5

Dogs that Point, Fish that Bite

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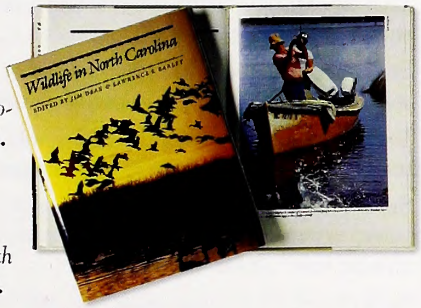

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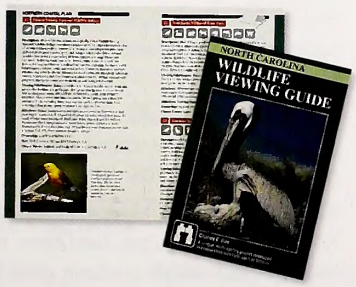

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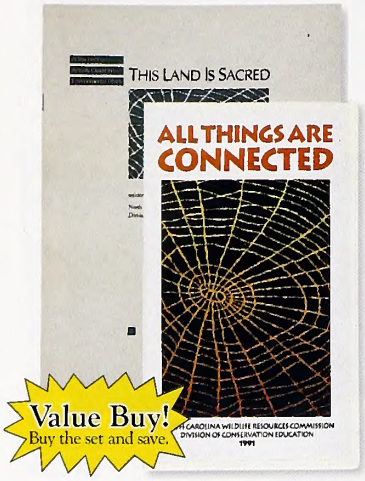

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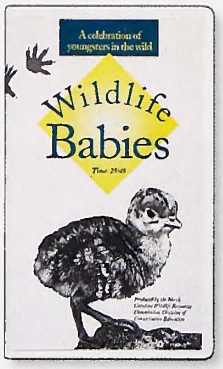

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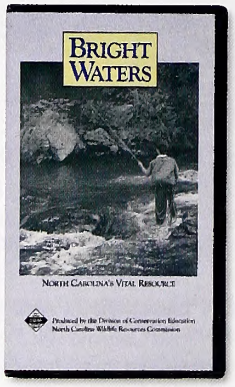

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ENDOW 98

Complete form and mail with proper payment to: Wildlife Endowment Fund, N.C. Wildlife Resources Commission, PO Box 29565, Raleigh, NC 27626-0565.
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Wildlife Commission **Spotlight**

The Gift That Lasts a Lifetime

MELISSA McCAW

To apply for a lifetime license or a lifetime subscription to *Wildlife in North Carolina*, use the form on the facing page.

Want to preserve North Carolina's outdoor sporting heritage and conserve fish and wildlife for future generations? The gift of a lifetime sportsman license for your child or grandchild is the perfect way to ensure both. At just $200 for infants and $350 for youths under age 12, this is a gift that truly lasts a lifetime.

Lifetime Licenses: A Wise Investment

As your child or grandchild grows, so does the buying power of the lifetime license purchase. Proceeds from the sale of lifetime hunting and fishing licenses are placed in the North Carolina Wildlife Endowment Fund, where only the fund's interest is spent. Since the fund was created in 1981, more than $15 million in interest has been spent for wildlife including the purchase of thousands of acres of public game lands and habitat improvement projects across the state. As the fund's principal continues to grow, the interest it generates plays an increasingly important role in supporting wildlife management, research, regulation, education and enforcement projects in North Carolina.

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Fattening Up

This hungry gray squirrel is oblivious to the crumbs still clinging to its chin whiskers, but we'll excuse its messy eating. He's in a hurry to fatten up before winter's cold blasts arrive.

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A Recipe for Christmas

by Jim Dean ©1998

JIM DEAN

"We hunted the following morning in a dense fog, with the lake as calm as oilcloth on a kitchen table. No ducks flew early and, after a warm sun burned off the mist, we stood in the blind and listened to the distant flute-like calls of resting swans."

We drove down to Mattamuskeet four days before Christmas. It was not going to be the same—I knew that—but I was hoping I would be the only one to notice. Beginning with my late grandfather and father in the late 1950s, a pre-holiday trip to this fabled waterfowl hunting lake has been part of family tradition. Some years we have only looked at the Canadas and ducks, or resorted to secondary plans to hunt off the lake somewhere, but it has always turned out to be special in some indefinable way. This year, at least, we had drawn a blind. There were, however, other changes that couldn't be helped.

Dad had decided to forego the trip because he felt that he would not be able to get to and from the blinds as he once had, and brother Graham had run into a last-minute conflict. Mom, though she never hunted, had always cooked our ducks or geese for a festive holiday feast, but she had died in 1992. And John's wonderful old lab Sanford was no longer with us, either. So, for the first time, there were only three of us—my brother John, my son Scott and myself.

Yet, we were off to a promising start. Ella Fitzgerald and Louis Armstrong were singing "Have yourself a merry little Christmas" when we pulled in near Rose Bay to buy a bushel of oysters. And when we crossed the causeway, flocks of geese and ducks were flying against the red sunset. Small groups bobbed along the bulrushes, and we could see large rafts of resting waterfowl farther out, mere dark patches against the reflected light. Our room was waiting at Mrs. Sadler's in Fairfield and the big cedar on the corner in front of the store sparkled with big colored lights.

We hunted the following morning in a dense fog, with the lake as calm as oilcloth on a kitchen table. No ducks flew early and, after a warm sun burned off the mist, we stood in the blind and listened to the distant flute-like calls of resting swans. But there was always tomorrow. And, besides, it has been years since we hunted more than memories anyway. Just being in duck country is enough to bring high spirits.

The afternoon was so unseasonably warm—in the mid 70s—that we pulled up lawn chairs beside the motel, retrieved the bushel of oysters from the shade and set to work with oyster knives, slurping the cool, salty oysters with a dab of Tabasco, then cleansing our pallets with nips of 16-year-old single malt. 'Twas fine, indeed, but the bright orange tabby that joined us spurned all our efforts to get him to eat an oyster. How odd, we thought. John's lab had loved raw oysters, even with hot sauce and horseradish.

Then Scott disappeared for a few moments, returning with two pie pans.

"I thought these might be appropriate," he said, as he peeled back the tinfoil on a pair of chess pies. "I made them using that old recipe that was always our favorite when we were growing up. You know the one, don't you?"

Indeed, we did. That chess pie recipe had come from my mother's mother. Two years before my mother died, she had asked me what I wanted for Christmas that year. "All I want is for you to write down all the old family recipes," I said. She had had a time converting smidgens and pinches of lard, flour and other ingredients into standard measurements for all those old recipes, but the result has proven to be one of the best legacies she left us.

That evening, contentedly full of oysters and pie, we walked into the banding site on the southeast corner of the huge lake just to look. In that vast amphitheater, we could barely hear each other speak amidst the cacophony of quacks and honks as lines of snow geese and tight, fast bunches of ducks passed overhead

That night, the wind came up, swinging out of the southwest. By the time we got settled in the blind, a pretty good chop had our decoys dancing. Scott fell in—upholding another family tradition—but the water was shallow and he said it wasn't cold. We knew better. But ducks were flying and we missed them (tradition dies hard). More flew; we missed them, too. Then, Scott made a fine passing shot on a drake pintail.

"That's enough," we agreed and retrieved our decoys. It was more than enough. Another holiday was upon us, rich as always, richer still because there were still three pieces of pie left for the trip home.

This Christmas, if you are fortunate enough to still have the opportunity, ask for those recipes in the handwriting you will always remember.

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Overwhelmed
by the holiday rush?

KEN TAYLOR

Fact: *North Carolina's black bears hibernate during the cold winter months, but they are wakeful sleepers. Even in the mountains, they awaken from time to time to move about or to feed.*

Take a break from the hustle and bustle with *Wildlife in North Carolina*.

Each issue, *Wildlife in North Carolina* will tell you many facts of interest about our state's wildlife and we'll also inform you about how we're managing our game and nongame species. We'll entertain you with articles about hunting and fishing, natural areas, outdoor recreation and conservation efforts around the state. And our great color photographs will astonish you.

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Contents

Wildlife in North Carolina

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

December 1998 *Volume 62, Number 12*

Features

4 **Made of Wood** *sculptures by Ron Mayhew*
Ron Mayhew loves the sinuous shapes of long-legged coastal birds, but he carves his remarkable menagerie out of native Appalachian hardwoods.

10 **My Best Duck Hunt**
written and photographed by F. Eugene Hester ©1998
Some waterfowl hunts linger in the memory for reasons that have nothing to do with the number of ducks killed. They are delicious reminders of the many gifts that hunting bestows.

16 **From Soup to Nuts** *illustrated by Kimberly K.C. Schott*
Try this groaning board of tempting sporting recipes for a complete holiday meal.

18 **A New Year's Christmas** *written by Mike Gaddis* ©1998
illustrated by David Williams ©1998
Some of the grandest moments of the sporting life are so brief that we can't explain them. We can merely hope to paint them on the canvas of memory.

22 **John Lawson's Legendary Journey**
written by Eric G. Bolen ©1998
When the young English adventurer John Lawson explored the Carolinas in 1701, he found a natural world teeming with wildlife and Indians. His book still opens a window on that lost world.

page 4

page 10

page 22

Departments

Our Natural Heritage *by Jim Dean* ©1998 .....**inside cover**
Nature's Ways *by Roger A. Powell* ©1998 2
N.C. WILD Notebook *by Carlton Burke & Consie Powell* ©1998 **28**
Back Porch *by Chris Powell* 32

page 28

Cover *This wood duck pair makes a handsome couple on a woodland stream. Photograph by Scotty Lovett.* ©1998

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Everybody Here Has Hair

written by Roger A. Powell ©1998
illustrated by David Williams

All mammals have hair and it's a good thing they do, for hair performs several essential functions that help mammals survive.

Some birds and insects have hair-like structures, but mammals are the only animals that have true hair. Mammals have two different types of hair that can have two different growth patterns. Cats and squirrels, for example, have hair with definitive growth that grows to a certain length and stops. Horses' and lions' manes and human hair are angora, and keep growing. Our hair grows until it falls out, and is then replaced by another hair. Horses' and lions' manes grow as long as the animals live.

Mammals have guard hairs and underhair. Guard hairs are the most visible hair because they are generally long, round, thick and stiff and form a smooth outer surface on a mammal's body. Some mammals have evolved modified guard hairs with special jobs, like the quills on a porcupine. Guard hairs protect the other type of hair, the underhair, and also guard the skin from scratches and scrapes.

Underhairs are thin and twisted to trap air under the guard hairs for insulation during hot and cold weather. Indeed, controlling body temperature, or thermoregulation, is one of hair's many jobs. When the temperature is really cold, or when a wind blows, a mammal can stand its guard hairs on end, allowing the underfur to trap more air for better insulation. In some mammals—deer, elk, moose and pronghorn, for example—each guard hair is hollow and traps air for insulation. The air trapped in these hollow guard hairs also insulates the animal from the heat.

Hair color also affects thermoregulation. Dark hair, especially black hair, absorbs heat from the sun quickly and helps a mammal keep warm. Light-colored hair absorbs little heat.

Coloration also plays a role in camouflaging some mammals and making others stand out. In many mammal species, the hair color matches the color of the animal's regular background, making it hard to see. White-footed mice have lighter coloration on their bellies than on their backs, a phenomenon known as "counter-shading." The shadow cast on the belly by the rest of the body makes the whole body appear uniform in color. Some mammals have stripes or spots that break up the outlines of their bodies, making them difficult to spot. Hair in the form of spots often mimics little patches of sunlight that dapple the forest floor, making a bobcat nearly invisible as it moves through the woods. Stripes may mimic patterns of vegetation or they may break up a mammal's outline. An eastern chipmunk, with its black, white and brown stripes, disappears against a background of leaves and sticks on a forest floor.

Striped skunks, in contrast, gain an advantage by being easy to see and easy to avoid.

Finally, a mammal's hair can help it communicate with other animals. When a wolf shows dominance over a subordinate wolf, the dominant wolf raises the hair on its shoulders and back, making itself look larger. When a weasel is excited, it fluffs its tail. When squirrels in your back yard chase each other and then stop, watch how they jerk their tails.

White-tailed deer lift their tails and fluff the white hairs on their rumps when they detect danger. The big, white patch of hair attracts the attention of nearby family members as well as the potential predator. Any deer that sees another deer bound high and flag its rump patch boldly knows that danger is present. Fawns, in the company of other deer, "flag" more than adults. But adult females also "flag" when they detect danger. Bucks flag the least, because they associate little with their kin. When the whitetail bounds just into the woods, however, it is likely to stop dead still and drop its "flag." When it does this, it becomes nearly invisible. The bold, white hairs that had drawn attention are gone and the deer's brown-gray coat blends with the forest background. As she bounded, her big flag told the predator "I have seen you; you can't catch me." Most predators, when faced with this scenario, give up and leave.

The next time your local squirrel gets on your bird feeder, take a close look at its fur. Notice the complexity of the colors. Notice how it can move its fur. Notice how its fur covers even the insides of its ears to keep them warm. Without hair, mammals simply would not be the same.

Roger Powell is an associate professor of zoology at N.C. State University.

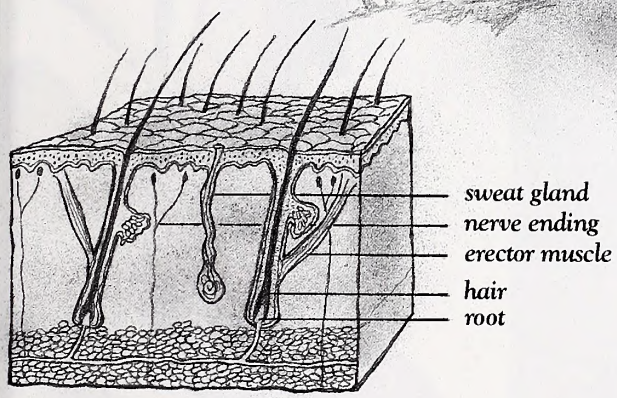
Other Reading

- Hamilton, W. J III. *Life's Color Code* (McGraw Hill, 1973).
- Ryder, M. L. *Hair* (Edward Arnold Ltd., 1973).

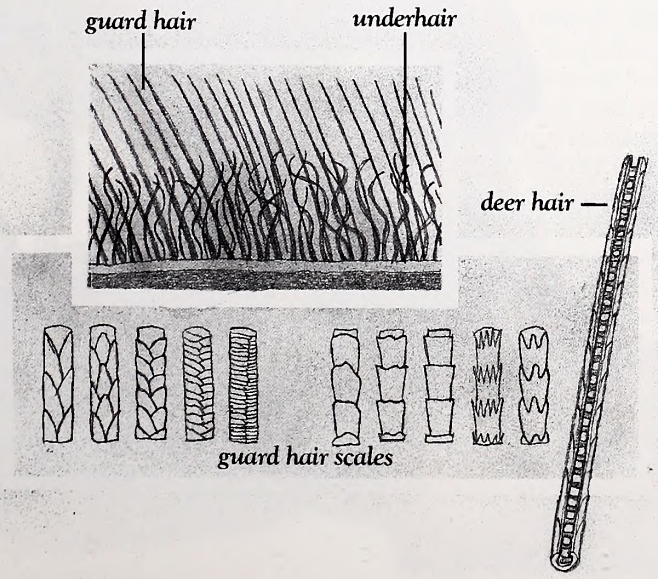
Surfing the Web:

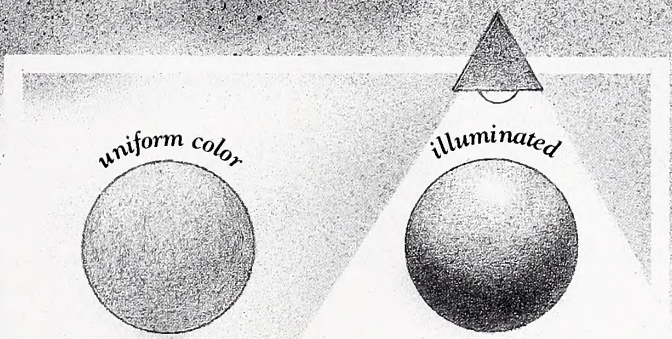
- For a complete listing of web sites on mammals in general, see this handy site at the Biodiversity and Biological Collections Web Server. *Address:* http://mus e.bio.cornell.edu/cgi-bin/hl?mammal
- For two sites about mammals in general, particular mammal species and how mammals evolved, see the Mammal Species of the World site, at the National Museum of Natural History, Smithsonian Institution, and the Museum of Paleontology at the University of California at Berkeley. *Address:* http://nmnhwww.si.edu/msw/ http://www.ucmp.berkeley.edu/mammal/mammal.html
- For a good site that discusses fish coloration, see the Coral Cay Conservation site. *Address:* http://www.coralcay.org/fishid/functions_of_colour.html

The spots of a *bobcat mimic little patches of sunlight that dapple the forest floor, making the bobcat nearly invisible. An eastern chipmunk (bottom, right), with its black, white and brown stripes, disappears against a background of leaves and sticks on a forest floor. A bobcat's fur consists of individual hairs growing from the skin.*

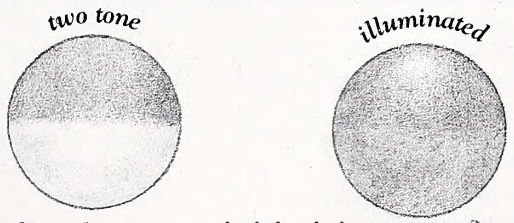


Each hair on a *mammal is associated with a muscle (above) that can cause the hair to lie flat or stand up to trap air. Guard hairs (below) protect the underhair and also guard the skin from injury.*





An object uniformly *colored, top and bottom, appears to be dark on its underside when lighted from above. Uniformly colored mammals usually live on the ground.*



An object that is *countershaded is darker on top. It is uniformly shaded when lighted from above, blending into its surroundings. Most mammals with countershading move above the ground.*

The outside of each hair is *covered with minute scales, visible under a microscope. The scales on the outside of guard hairs differ between species and they can be used to identify species. Some mammals, including deer, have hollow guard hairs to provide more insulation.*

LYNNE MAYHEW

TURF WARS

Butternut. 36" x 24" x 23".

I chose the subject *matter because of the artistic qualities of the snowy egrets —their long necks, long legs and long bills. There's a lot of tension and action in their pose. This is not a serene scene. It was the most difficult piece I had done to that point because a lot of the carving runs contrary to the grain of the wood. Wood's strength lies with the grain and when you go across it you have to compensate. This carving won second in the 1994 Ward World Championship.*

PHOTOGRAPHY BY RON MAYHEW

MADE of WOOD

Ron Mayhew loves the sinuous shapes of long-legged coastal birds, but he carves his remarkable menagerie out of native Appalachian hardwoods.

sculptures by Ron Mayhew

If there's a visual theme in Appalachian artist Ron Mayhew's work, it's the place where land and water meet, where life occurs in its most colorful and diverse forms. Herons, ibis, reptiles, fish, amphibians—all of these creatures appear and reappear in Mayhew's carvings like primitive totems.

If you ask him why he chooses these subjects to carve and not others, he's not sure how to explain it. "I've always been fascinated with what goes on where water and land and air meet—the shorelines to rivers, lakes, even the ocean," he says. "There's such an abundance of life there."

"It also probably has something to do with the forms and the shapes of these animals," he adds. "Many of them have long legs or long necks; they're strong, creative shapes that I enjoy working with."

Though Mayhew loves coastal forms, he has chosen to live in the mountains where he finds the solitude and peacefulness he needs to pursue his work. The 55-year-old sculptor has lived in Canton in the shadow of the Great Smokies for 22 years and he carves his menagerie in the native hardwoods of the region.

"Walnut is my favorite, but I also use butternut, cherry, maple and oak. That's one of the neat things about living here—the raw materials are all around me," he says.

Mayhew has had a long interest in working in a three-dimensional art form like sculpture. "I was always more fascinated with the sculptures than the paintings when visiting art museums as a child," he says. "Wood has a life to it, a feel. It was a living thing at one time. It's a challenge to work in wood. The wood's grain runs in only one direction and sometimes I carve against the grain or across the grain to give more life to the piece. The chisels and gouges I use are traditional ones, and many of them are over a century old."

Mayhew says he doesn't sketch his subjects beforehand, preferring rather to carve directly from his mind's eye. He always starts with the subject's head. Once he has the head and the eye, he says, the piece has a life of its own and the process of carving is like liberating the animal from its wooden prison.

Mayhew's work has been collected extensively, with some of his artwork in private collections as far away as Russia and Australia. He shows his work at a variety of wildlife art shows, such as the Southeastern Wildlife Exposition in Charleston, S.C., and the Waterfowl Festival in Easton, Md. In the 1994 Ward World championship Wildfowl Carving Competition in Ocean City, Md., Mayhew placed second in the world in interpretive wood sculpture.

Although Mayhew's work seems realistic, he doesn't like to call himself a realistic sculptor. "When I compare myself to realistic bird carvers, what I see in them is that there is not much left to the imagination. With my work, I like to feel that there's lots to look at but also lots left to the imagination. In the sculpture of the two egrets, for example, there's tension and movement in the piece, but the viewer needs to fill in some of the gaps. I like pieces that can be enjoyed from any angle."

Ron Mayhew's work is definitely worth more than a single look.

—Lawrence S. Earley

GLOSSIES

Black walnut. 38" x 24" x 24".

This carving of *glossy ibises on a mangrove tree was somewhat more difficult than the egrets. I wanted to play off the curved bills of the birds with the curved roots of the mangrove. I've portrayed three typical activities of the bird—mating behavior (above), preening and feeding. The composition was extremely difficult.*

Fishing Egret

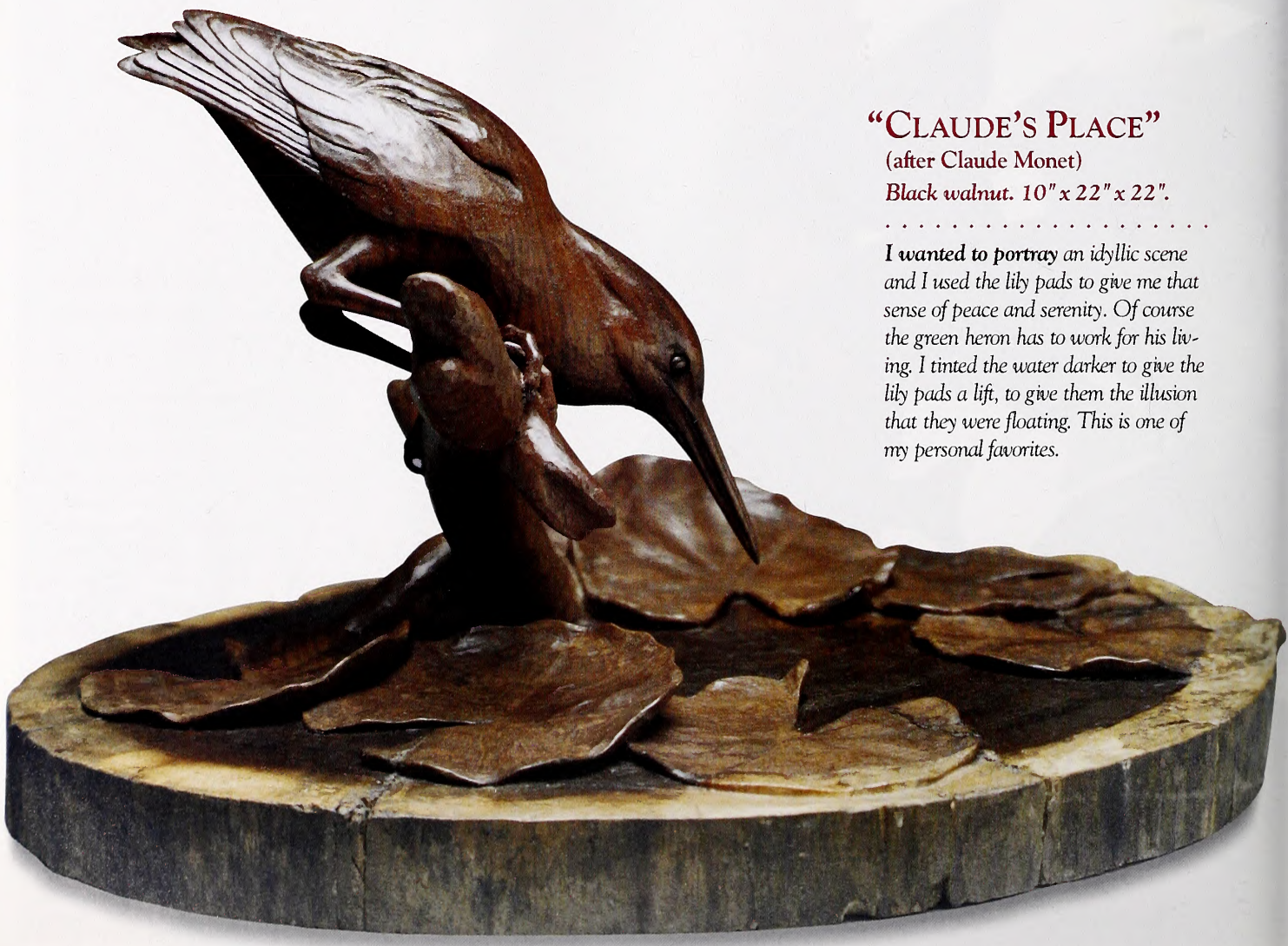
Spalted sugar maple. 24" x 18" x 18".

***Spalting is the** result of a fungus that attacks dead wood and stains it. I like the effects on wood and used it for my design. That's why the egret's wings are elevated, to show as much of the spalting as possible.*

Schoolin' Around

Black walnut with a maple inlay. 16" x 18" x 3½".

***I was exploring** negative space in this work—in other words, not just the carved piece but the space around it. All my work is carved out of a single piece of wood. Part of the challenge for me here was to have the fish touch one another to provide support for the whole carving. Also, it provided a strong design. Because I wanted the illusion that the fish were floating, the fish had to be free from the base of the sculpture.*



"Claude's Place"

(after Claude Monet)

Black walnut. 10" x 22" x 22".

. . . . . .

I wanted to portray *an idyllic scene and I used the lily pads to give me that sense of peace and serenity. Of course the green heron has to work for his living. I tinted the water darker to give the lily pads a lift, to give them the illusion that they were floating. This is one of my personal favorites.*

Iguana Study

Butternut. 14" x 8" x 6".

The iguana is just *a figment of my imagination, made up of bits and pieces of one species and another. I was interested in the wrinkled skin. I try to make all my sculptures interesting from many angles so that there is something visually exciting from any point you view it.*

Changes in Latitudes

Black walnut. 33" x 20" x 18".

This sculpture was *a wedding gift to my son and daughter-in-law. He's a Jimmy Buffett fan like his father so I built in the tropical theme with the macaws, the iguana and the tropical foliage. The upper bird is pretty daring; I'm pushing the medium. I had to work diagonally against the grain of the wood and that made the piece challenging.*

For information about Ron Mayhew's wood sculptures, write him at his studio:

Ron Mayhew
352 Wilson Drive
Canton, N.C. 28716
(828) 235-8607

My Best Duck Hunt

Some waterfowl hunts linger in the memory for reasons that have nothing to do with the number of ducks killed. They are delicious reminders of the many gifts that hunting bestows.

written and photographed by F. Eugene Hester ©1998

By the time a hint of sunrise was visible, I had placed my dozen homemade decoys in the old millpond and settled into my makeshift hunting blind. It was a cold morning, and the breeze from the north made it seem even colder. The breeze was a welcomed one, though, since it gave motion and the appearance of life to my decoys.

I grew up in North Carolina's interior, where ducks were not plentiful. We had wood ducks and a few mallards on the local creeks and millponds. Other duck species appeared on rare occasions.

On many hunts I did not get a shot, and on some hunts I did not even see a duck. But these experiences never dampened my enthusiasm, and I always envisioned a more exciting hunt next time.

On this cold morning I scanned the sky, hoping for ducks. At first I only saw crows and a single great blue heron. Soon after sunrise, I saw a smudge of birds in the distant sky. As they neared, I could distinguish about 10 ducks making their way for the swamp at the head of the millpond. When they circled and began descending, ready to land among the stumps and bushes, I quickly grabbed my duck call and made what must have been a very awkward imitation of a calling duck. Surprisingly, it worked. The ducks leveled off at treetop height and swung in my direction.

My heart pounded as the ducks came right to the decoys. As they set their wings and extended their feet for landing, I fired. Two wigeons fell from the flock, beautiful birds and real trophies for me.

That duck hunt happened almost half a century ago, but I have relived it in my memory many times. Although I 've had dozens of other hunts, this one was the most memorable not

***The sight of a** drake mallard descending through flooded timber can stir the heart of even the most seasoned duck hunter. The sights and sounds of that "special" duck hunt are hard to forget.*

For some hunters, *thoughts of that most memorable waterfowl adventure conjure up images of fixed blinds, rafts of decoys and the vastness of eastern North Carolina's sound country. The sight of a descending canvasback (above) provides icing for the cake.*

because I killed two ducks or because my shots had been well-placed, but because of the way I had made it happen. I had made the decoys of cork and boards and painted them myself. I had also made the hunting blind by nailing old boards onto trees on the side of the millpond. And as awkward as the attempt was, I had called the ducks in. It was my greatest duck hunt ever.

In my conversations with other hunters, I have found that they, too, have fond memories of hunts. Each hunt was different, but all were meaningful for some special reason.

Keith Cooke, of Wendell, recounted with enthusiasm his most memorable hunt. It was in a big Wake County beaver pond.

"We had hunted this swamp several times," he said. "This large beaver pond was built on a creek and flooded about 40 acres of woodland. The pond had been there for several years, and many of the trees had died and fallen into the water, making it more open than most of the swamps we hunted. But the fallen trees provided a lot of underwater logs that made wading difficult.

"We almost always saw ducks in this swamp. Mostly we saw wood ducks, and usually we killed a few.

"On this particular morning, six of us waded into the swamp in darkness. Each of us had a gun and some decoys. We carried a dozen mallard and eight wood duck decoys.

"It was really cold, and in most places we had to break ice and climb over sunken logs in the dark," Keith said.

"As we approached the creek channel, we found more flowing water and less ice. Suddenly, I tripped over a submerged log. I did not just fall in the water; I went in over my head—waders, gun, hunting coat and all. Everything got soaked.

"We didn't stop. We put out our decoys in the biggest opening we could find in the swamp. We put the mallards together and the wood ducks together and left an opening between them where the ducks could land. Then we hid among some big trees and in the edge of bushes.

"It was a cloudy day, and so cold that the ice was refreezing where we had just broken it," Keith continued. "When I tried to load my soaked gun, I found it was frozen shut. I couldn't even get a shell in it.

"When shooting time came, I stood there soaking wet with a nonfunctioning shotgun. I watched as my companions killed two wood ducks as small flocks hurried by. Within minutes the wood ducks were gone and all was quiet.

"Suddenly we heard a flock of about 20 mallards overhead. They were making wide circles high over the swamp. We stayed hidden and began calling. They circled a couple of times and then cupped their wings and, with their feet out, began landing in our decoys. When they were only a few feet above the water, my companions began shooting. They got two drakes and one hen.

"Those mallards came in better than I had ever imagined," he said. "It was so

exciting! It was my best duck hunt, even though I never fired a shot."

Jerry Richardson's most exciting duck hunt happened a few years ago on the Smith Creek impoundment of the Goose Creek Game Land in Pamlico County.

"Seven of us went on this hunt," he said. "It was the first time we had hunted in the coastal part of the state. We had mostly hunted millponds and beaver ponds around home.

"We left home east of Raleigh at 2 a.m. on the day before Thanksgiving and traveled in two vehicles. One was a pickup truck loaded with decoys and a johnboat.

"We arrived well before light and went into the hunt area by flashlight. We used the johnboat to get across a ditch and into the area," Jerry said. "We also used it to carry the guns and over 50 decoys. When we came to an open area, we stopped and started putting out decoys.

"The area had a lot of grass with some small open-water areas, so we put some decoys in each opening. Four hunters hid beside the decoys, and the other hunters did not use decoys. We used makeshift blinds made from sticks and burlap.

"We didn't know what to expect on this type of hunt. The area was new to us, and this was one of our first attempts at a 'do-it-yourself' type of hunt. We were just learning about how to use decoys, how to call ducks, and how to hide in the natural vegetation.

"The weather was clear and cold. It was one of the first cold days of the season," Jerry recalled. "At daybreak the ducks began flying. There were a lot of little flights with two or three birds at a time. Then we saw larger flocks of teal, wigeons and gadwalls. Some of them—especially the teal—decoyed; others just flew by, and we got pass shooting. Before the day was over, we probably saw 300 ducks.

"The seven of us killed about 10 ducks, mostly from early-morning pass shooting. We certainly did not get our limits, but it was a memorable hunt because it was our first coastal hunt; we were on our own, hunting without a guide," Jerry said. "Everything worked out just right."

For other hunters, *that greatest duck hunt occurred in a more austere setting such as a beaver swamp in the companion of a trusty dog and good friends. Keith Cooke (below, left) and Jerry Richardson set out a few decoys for a swamp hunt. Though wood ducks are more common, wigeon (left) and green-winged teal (below) can also be taken from eastern swamps.*

***The beauty of the** ducks, themselves, adds to the waterfowl hunting experience. Few can debate the colorful merits of the regal canvasback.*

William Hester, told of growing up in Goldsboro and hunting in 1974 with Clarence Hodges in blind no. 18 at Lake Mattamuskeet. It was located on the northeast side of the lake, and the two used a juniper skiff with an outboard motor to get to the blind. The boat had no seats, and the hunters had to sit on the gunwales or transom. They went down a canal to the lake. William was hunting with several others, including his brothers, Jim and Joe.

The blind was on a point that protruded into the lake. Decoys were spread all over, including some out of range.

"It was my first really great duck hunt," William said. "Previously I had only hunted farm ponds and millponds for wood ducks. That day we killed pintails, wigeons and two Canada geese. Everybody got at least one bird. I killed my first duck, a wigeon.

"I remember everything about that day, even though it was 24 years ago. I remember being in the Quonset hut before daybreak to punch our blind number for the day, then the trip to the boat and the boat ride to the blind. It was my first duck hunt on a big lake with lots of ducks and geese. It was a great hunt."

Mike Hayden recounted a hunt years ago with his two-year-old female Labrador retriever Babe. After buying the dog, he found that she was gun-shy. She knew he kept his guns in the closet, and every time he even opened the closet door, she would hide. It took months of working with her to overcome the problem, but they did it.

Early in the duck season, Mike was hunting with Babe after first light. No ducks were flying as they waited and watched. Then they heard a volley of shots across the lake. "Somebody is getting some action," he thought.

"I picked up my decoys and drove over there hoping to find a better area," he said. "What we found was a 12-year-old boy with tears in his eyes. The boy, along with his father, had each shot a drake mallard coming to their decoys. Although they had killed the two ducks, the wind had caused them to drift out about 150 yards.

"The boy told of how he had killed his first duck, but they could not retrieve it because the water was too deep for his father's waders. Without a boat or dog, they could not get his prized first duck.

"We tried to get Babe to see the ducks, but they were too far away," Mike said. "I picked up a medicine bottle on the shore and threw it toward the first duck. Babe swam out and got the bottle, but she obeyed my hand signals and ultimately saw the duck. She brought back both the bottle and the duck and gave the duck to the boy. His tears became a smile. I have never seen a boy so happy. He explained all about his plans to tell his mother about this exciting experience.

"I then threw the bottle again, and Babe again retrieved the bottle as well as the second duck. It was my most memorable duck hunt, and I never even fired a shot."

Ralph Wear of Salisbury told me of hunting on Pamlico Sound east of Belhaven. Ralph, his father Dr. John Wear and two others had put out a lot of decoys in front of one of their two blinds. They arranged the decoys in a J-hook configuration, with most decoys clustered in an arc in front of the blind, but with a long string of decoys extending farther into open water.

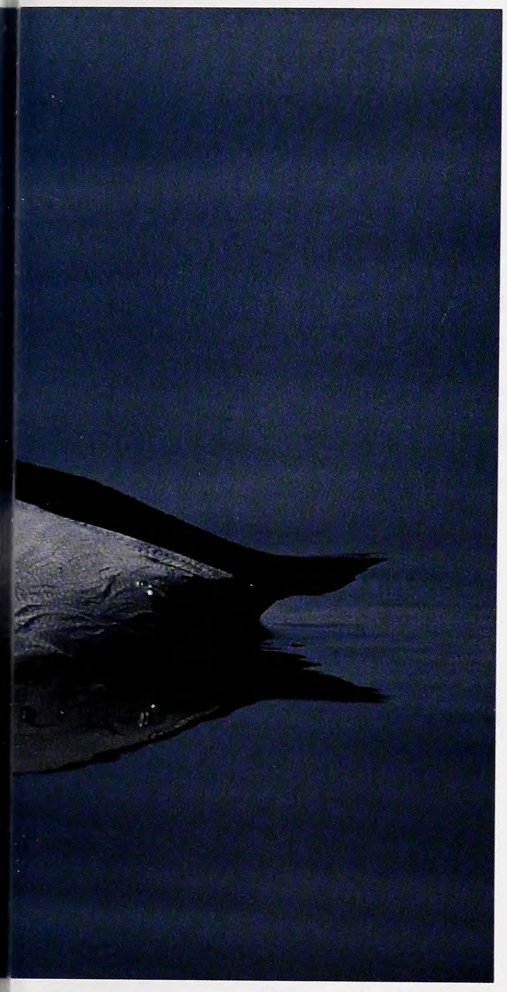
Waterfowlers have used this technique effectively for centuries. The concept is that as diving ducks find this long line of decoys, they will follow it to the greater concentration and land in the open part of the arc, in front of the blind.

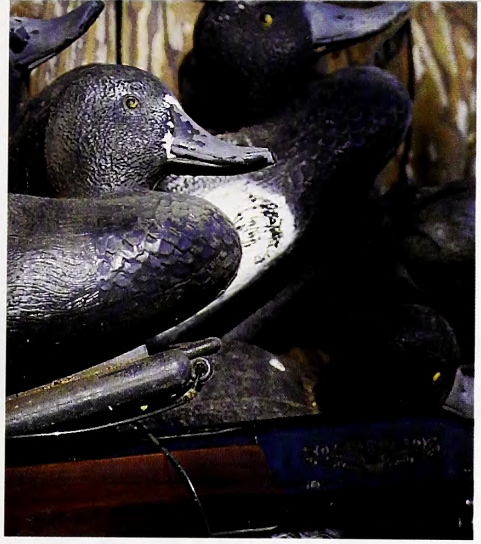
"Twice Dad and I had about 100 bluebills follow that line and come to our blind," Ralph said. "There were a lot of ducks flying that day, and we saw a lot of action. By 8:30 that morning, Dad and I had our limits.

"We signaled to the other hunters to come over and use our blind. They did. Soon another large flock came. One hunter go so excited that he shot straight into the air and forgot to pump his gun, so he could not get a shot at the ducks. The second hunter had the brass separate from his shell casing, so he only got one shot.

"Though we did not all get limits, we saw hundreds of ducks, and they came to our decoys so well, just like you hope they will but they seldom do. It was a great hunt and one we will long remember."

Duck hunting provides lasting memories. They are about beautiful sunrises, decoys, great dogs, companionship. They are about calling ducks and watching them come in close. And often enough, as my friends can testify, the memories have little to do with how many ducks were killed. ⊠





Duck hunting *provides enduring memories of sunrises, decoys, calling ducks, companionship and great dogs. Spotting a flight of wary pintails (above) and bringing them in close can provide all the satisfaction needed to make for a memorable duck hunt. Ralph Wear and his yellow lab Rock, meanwhile, relax on the porch after a good day of "Down East" waterfowl hunting.*

From Soup to Nuts

Try this groaning board of tempting sporting recipes for a complete holiday meal.

illustrated by Kimberly K.C. Schott

There's a sporting flavor to this holiday meal, but everyone will enjoy it nonetheless. Our cooks have provided recipes for everything from soup to nuts, although you can add your family's vegetable dishes to customize your table. This meal can feature your choice of either wild goose, wild turkey or venison. If you're cooking for a large group, or for a meal that will never be forgotten, there's no law that says you can't prepare all three! After this festive meal, and before you retire to the couch for some post-prandial dozing, don't forget to toast the chefs!

hors d'oeuvres:

Pickled Shrimp

2 pounds boiled, peeled jumbo shrimp
1-2 medium onions
2-3 bay leaves
Marinade:
1/3 cup salad oil
2 teaspoons vinegar
2 tablespoons catsup
1 teaspoon prepared mustard
Tabasco sauce (few drops)
1 teaspoon salt
3/4 teaspoon chili powder
1/4 teaspoon sugar
1/8 teaspoon dry mustard
dash black pepper
dash paprika

Place a layer of boiled, peeled jumbo shrimp in a glass dish or jar, then add a layer of sliced onions plus two bay leaves. Alternate layers until dish or jar is full. Combine marinade ingredients and shake well. Pour over layered shrimp and onions; marinate at least 24 hours in the refrigerator. Eat and enjoy!

Serves 12.

(Rick Hamilton, Raleigh)

soup:

Triple D Gumbo

This is easier than it looks, and a great way to clean out the game freezer.

duck breast fillets, cut into small pieces (2-4 breast fillets, depending on size)
dove breast fillets, cut into small pieces (10-20 doves)
deer meat, cut into small pieces (1-2 pounds)
1 pound kielbasa sausage, cut into pieces
bacon drippings
1 large green pepper, chopped
1 large onion, chopped
5 cloves garlic, minced
1 teaspoon salt
1 teaspoon black pepper
1 14-ounce package of frozen okra
2 16-ounce cans of stewed, chopped tomatoes
8 ounces mushrooms, chopped
1 can beer
1 cup oil
4 bay leaves
Worcestershire sauce
Tabasco sauce
10 cups water
2 cups flour

In a large skillet, brown duck, deer, dove and kielbasa in bacon fat. Remove. Add garlic, green pepper, onion and mushrooms to skillet and sauté. Remove. In large pot place all meat, one-half the garlic and vegetable mixture, plus salt, pepper, okra, tomatoes, beer, bay leaves and water. Simmer 45 minutes. Heat oil in skillet, add flour and brown, stirring constantly for 15 to 20 minutes.

Add flour mixture and remaining sauteed vegetables and cook 10 minutes longer. Add liquid if necessary. Season to taste with Worcestershire and Tabasco. Serve over hot rice.

Serves 8-10.

(T. Edward Nickens, Raleigh)

entrees:

Goose Orange

1 cleaned Canada goose and giblets
1 tablespoon butter
1 small can orange juice concentrate
3 oranges
1 tablespoon flour
1 medium onion, peeled
Salt and pepper to taste

Simmer the giblets in water for 30 minutes, reserving stock. Chop giblets. Melt butter and stir in flour. Add stock from the giblets and orange juice and set aside. Season the goose with salt and pepper inside and out. Put the onion and one peeled orange in the cavity. Put onto a rack in a roasting pan and cook for 45 minutes at 450 degrees. Reduce the heat to 350 degrees; pour the orange juice mixture over the goose and cook until done, which will be about 20 minutes per pound. Remove the goose, make gravy from the pan stock and decorate for presentation with orange slices. *Note:* A Brown-in-Bag

works well for this recipe and will ensure a moist, delightful meal.

Serves 5-6.

(Rick Hamilton, Raleigh)

Wild Turkey (Sharpe's Favorite)

1 cleaned wild turkey
3 cups chicken broth
4 tablespoons all-purpose flour (enough to make a thin broth)
Salt and pepper to taste

Place turkey in a large saucepan. Add salt, cover with water and simmer until tender. When tender, remove from water and bone. Chop meat in rather large chunks and place in a large Pyrex baking dish. Make a thin gravy from flour and chicken broth. Pour this over chopped turkey. Add salt and pepper to taste. Place in a 400-degree oven until it browns and serve with your favorite dressing.

Serves about 12 people.

(Virginia Sharpe, Hamlet)

Venison Vegetable Pot Pie

Filling:
venison stew meat cut into chunks (1-2 pounds)
1 celery stalk, chopped
2 teaspoons salt
1/2 teaspoon black pepper
1 beef bouillon cube
2 medium potatoes, diced
2 carrots, diced
1/2 cup canned corn
1/2 cup canned peas
Pastry:
1/2 teaspoon salt
4 teaspoons ice water
1/4 cup all-purpose flour
1/2 cup milk
2 cups venison broth
1 cup all-purpose flour
1/3 cup vegetable shortening
1/2 cup melted butter

Place venison, celery, 2 teaspoons salt, pepper and bouillon in a pot, cover with water and cook until the meat falls apart. Strain the broth and set aside. In a separate pot, gently cook potatoes and carrots until soft; add canned corn and peas and set aside.

Make the pastry by sifting 1 cup flour with 1/2 teaspoon salt in a bowl. Add shortening and work with hands until flour and shortening have blended. Add ice water and mix thoroughly and quickly. Place dough on a plate and refrigerate (covered) for 15 minutes.

Melt butter in a saucepan and add 1/4 cup flour and stir until the paste becomes almond color. Stir in venison broth and mix, then add 1/2 cup milk. Add the meat and vegetables and mix gently, then transfer to a casserole dish. Make a top crust with the dough, brush with melted butter and bake at 425 degrees until the crust is lightly brown.

Serves 4. Double or triple the recipe or more for larger crowds. This old Pennsylvania Dutch recipe makes fitting fare for any occasion.

(Rick Hamilton, Raleigh)

side dish:

Cranberry Apple Chutney

6 naval oranges
2 cups cran-raspberry juice
1/3 cup light rum (or apple juice)
1/4 cup vinegar
2 cups sugar
6 cups (2 pounds) sliced, pared Granny Smith apples
6 sterilized, hot jelly jars

Peel oranges, reserving outer rind of one. Cut reserved rind into thin julienne strips. Cut oranges into sections. In large pot simmer cran-raspberry juice, rum, vinegar and sugar until consistency of thin syrup is reached. Stir in apples; cook 20 minutes, stirring occasionally. Add julienne orange rind and orange sections to pot and cook, stirring occasionally until mixture is very thick. Pour mixture into sterile, hot jars. Cover with lids; cool completely. Store in refrigerator up to one month. A wonderful condiment to complement a holiday turkey or ham.

Makes 6 half-pints.

(B.B. Gillen, Raleigh)

dessert:

Persimmon Pudding

2 cups persimmon pulp
1 1/2 cups sugar
1 stick margarine
4 eggs
3/4 cup self-rising flour
1 cup milk
1 tablespoon cinnamon
1 tablespoon vanilla
dash of nutmeg

Wash persimmons and mash them through a colander into a pan. (Don't use green persimmons!) Taste pulp and make sure it's okay. Adjust amounts according to taste—more 'simmon pulp equals more 'simmon taste. Yum Yum!

Mix ingredients until smooth. Pour into greased 9x14x2-inch Pyrex dish. Cook about one hour at 350 degrees.

Serves 4-6..

(Jim McEwen, Hamlet)

nuts:

The Grinch's Deviled Nuts

1 1/2 cups pecan halves
1 1/2 cups blanched, whole almonds
1 tablespoon butter, melted
1 tablespoon cooking oil
1 teaspoon salt
2 teaspoons celery salt
1 1/2 teaspoons chili powder

Preheat oven to 300 degrees. Place nuts in a 13x9x2-inch baking pan. Mix remaining ingredients. Drizzle over nuts; stir to coat. Bake until almonds are lightly browned 25-30 minutes, stirring often. Can be served warm or cool.

Makes three cups.

(B.B. Gillen, Raleigh)

beverages:

Wassail

1 gallon apple cider
2/3 cup sugar
2 teaspoons whole cloves
2 teaspoons whole allspice
2 3-inch cinnamon sticks
juice of two oranges
2 oranges studded with cloves
1 pint to 1 fifth Apple Jack brandy or rum (optional)

Simmer first five ingredients for 20 minutes. Add clove-studded oranges and liquor to taste. Reheat and serve.

Serves 10.

(T. Edward Nickens, Raleigh)

Hot Apple Cider

1 quart apple cider
2/3 cup light or dark corn syrup
3 cinnamon sticks
1/2 teaspoon whole cloves
1 lemon, sliced
Add more cinnamon sticks and lemon slices for garnish

In a 3-quart saucepan stir apple cider, corn syrup, cinnamon sticks, cloves and lemon slices. Bring to a boil. Reduce heat and simmer 15 minutes. Remove lemon and spices. Garnish each serving with a cinnamon stick and half a lemon slice.

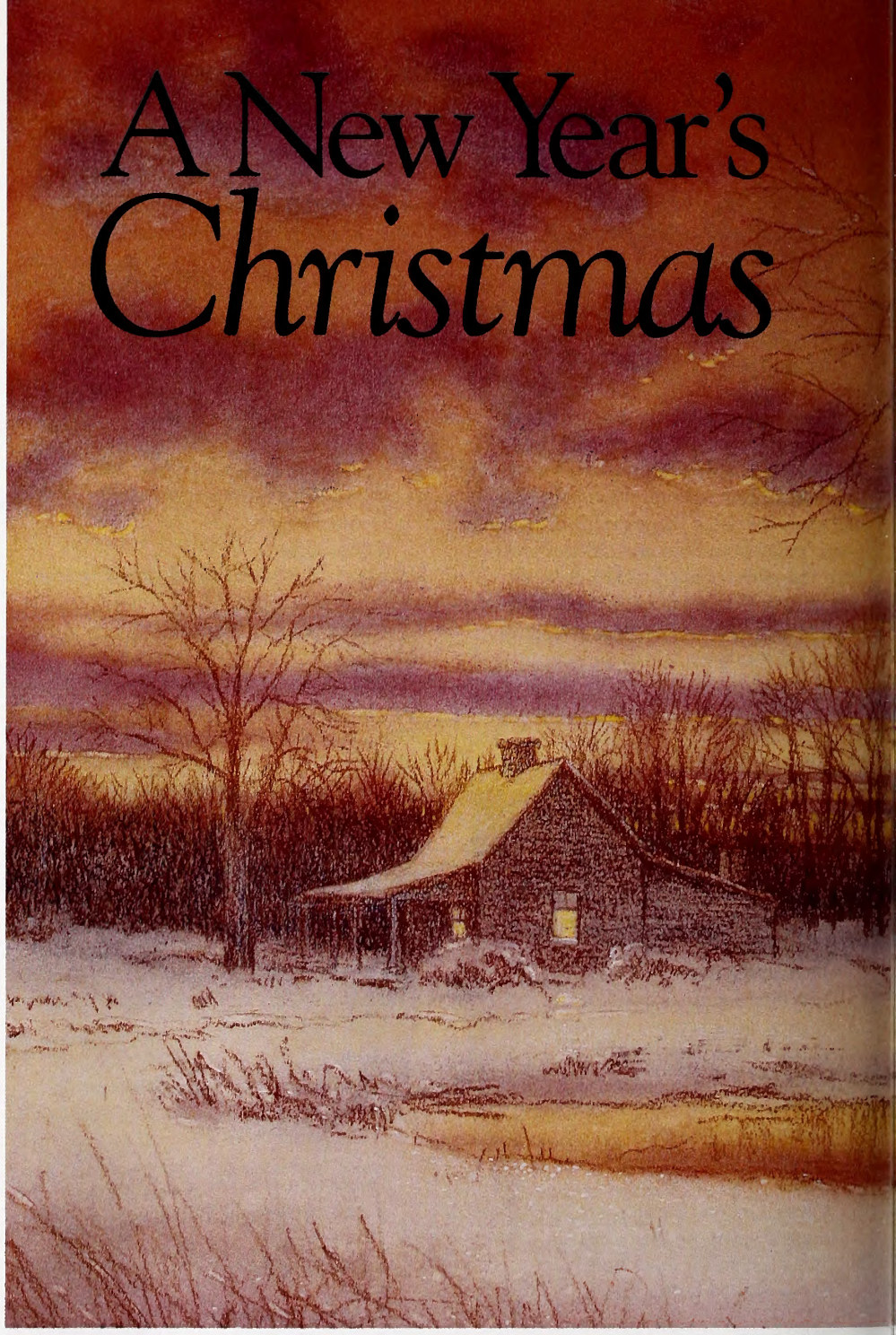
Serves 4-6 cups.

(B.B. Gillen, Raleigh)

A New Year's Christmas

Some of the grandest moments of the sporting life are so brief that we can't explain them. We can merely hope to paint them on the canvas of memory.

written by Mike Gaddis ©1998
illustrated by David Williams ©1998



We took the field in the unspoken glow of reunion, with a single, seasoned setter and a heritage of double guns. In the shadow of a somber sky, the withered fields sprawled away in promising patches of gray and silver. Hedges and briers outlined the fields like grizzled whiskers. There was a bounce in the aging setter's step again, a crack to her tail, conviction in the way she grabbed the long, winding edges. There was the lay of the gun across your shoulder, the perfect nestle of the butt stock in your palm and the soft rattle of shells in your pocket.

The setter was reaching, propelled by heart and hunt. Well out, she took another stretching edge to its fold and carried its bend, a gliding white glimmer of resolve. I called to her once out of habit, momentarily forgetting she could no longer hear. Even so, she started to return, nose working the entire way.

As surely as young dogs try your religion, old dogs affirm your faith.

She went birdy along a ragweed strip shouldering a haven of partridge peas. We watched her back cave, her tail quicken, her nose scour the slight breeze for certainty. A correction, a few mincing steps, and she found it, slapping hard into point. We reached her, guns ready, just as the running birds went up far ahead, wheeling and skimming the stubble, then gathering and ascending in an abrupt swoop over the tree tops, and gliding far into the adjoining bottom. We watched them away, spirits momentarily arrested, no chance for a shot.

"Pretty, nonetheless," Scott said.

"Uhmmn," I agreed.

Meg was standing patiently, softly flagging, awaiting release. I sent her on.

"They're probably in that overgrown cutover," said Jim to his son, Scott.

"Likely," I agreed, "Meg thinks so."

We followed our dog, but the prospects looked daunting. The young pines were head high and the undercover so dense, it was virtually impenetrable. The setter challenged the briers, got serious one time, but earned little more than a bloody tail. Finally we gave up. We had but the last two hours of the afternoon, and already one was spent.

"Probably fly in and out to feed," I said.

"Yeah, and mainly out," Jim joked.

There was a decision at hand. The light would retreat rapidly under the droopy sky. We

rested our hopes on the heads of lespedeza along the hillside adjacent to the pond bottom. The birds there had been fairly reliable. Today, of all days, the covey should move.

The afternoon was closing, still it retained a peculiar expectancy as if there were something yet to happen. It was a thing you could not touch or hold, but could sense and feel. There was a bracing bite to the air now, a faint drift of wood smoke. Amid the growing chill and dampness, the temperature was dropping. Sparrows and juncos skittered along the fencerow, anxiously bunching and twittering. Twigs and briers swished in whispers against the canvas of our hunting chaps. All else was still. The scattered pines and cedars stood gray-green and motionless against the tawny sedge. Ashen columns of wild plum and autumn olive massed solemnly on the drab hillside.

"I remember days like this with my grandfather, on this very ground," said Jim, closing to my side. "They were always my favorite."

"So long ago," he added, thinking out loud, "and only yesterday."

We stood there quietly then, for a moment, wondering about the years that had swiftly passed, studying the boy and the dog ahead.

"But now you know what he felt," I offered.

We moved tranquilly on, gaining Scott's company beyond the hedgerow, and a few yards farther finding our dog missing.

A short search revealed her beautifully motionless also, a part of the waiting landscape. The cover had opened to a small, sparsely grown corner on the slope of the hillside, which on a clear day caught the sweet, nurturing rays of the falling sun, enabling the seed lespedeza to flourish. Meg stood on her toes, leaning slightly against the scent, nostrils rhythmically pulsing.

"Gotcha, Meg," I acknowledged, as we walked to her. She cut her eyes to me, then back. I was certain then.

We stood for a moment, anticipating what excitement the next few moments might offer. When finally it seemed imperative, we strode in, Scott to my left, Jim to my right, and kicked the birds out. Up and across the small, open amphitheater they blew, wind and wing, folding right and left a dozen strong. I caught the terse swing of Scott's 20 gauge out of the corner of my eye and heard the double-punch of its report, and then I found my own bird and pulled. Barely short of the woodsline, the small knot of brown collapsed, tumbling limply earth-bound below a sudden shatter of feathers. Just behind, the roar of Jim's 12 reverberated against the creek bottom, two shots virtually together, one thudding heavily against the other. Then the hillside was abruptly quiet again. Between us, a brief flurry of pinfeathers drifted slowly by, and with it the afterglow of a thing well done.

Three birds had stayed behind, one to each gun, beneath a classic covey rise.

In a burst of exhilaration, Meg was off to gather first my bird, then Jim's. We held them in hand, almost as if they were our first, momentarily forgetting that Scott was trying unsuccessfully to get the 13-year-old "puppy" in to hunt the third.

"When you ol' timers quit dotin', how

'bout a hand," he called, with mock sarcasm.

The setter bitch was cutting up the hollow, hard after singles. "Meg, dead in here," I admonished sharply. Using her hearing impairment to full advantage, she bored off on another loop. "*Heyee!*," I yelled, reminding her that affection has its limits, even with grandmas.

She returned then, working with a frenzy. Immediately drawn to the site of the fall, she stiffened briefly, then stabbed the shrub cover with a cocked muzzle. Emerging quizzical and birdless, she hesitated, then rekindled the search. Quickly, she locked on the ground trail, weaving away in furious spurts. Ten yards, then 15. "Dead, Meg, dead bird, dead!" Scott encouraged. Tail whipping furiously, she checked briskly right and left, corrected, then spurted ahead again. Five yards more and she froze into a crouching point.

Richly brown and golden and aproned in white, the hen bird lay limply on her back in the grass beneath the setter's nose.

"Nice, Meg," I whispered, stroking her kindly. I gently picked up the bird, shared it with my dog and handed it to Scott.

"Thanks," he replied, smoothing the checkered breast feathers. "You too, Meg," he remembered.

He was bright with excitement, vibrantly aloft with the exhilaration of it all.

"This is the way it used to happen, Scott, more often than not," Jim said. "At least, it seemed that way."

We chose not to follow the singles for fear of scattering them more. Evening was close and carried with it the threat of weather. Reluctantly, we left the little headland and wandered easily back up the bottom, talking happily of this day and others, gleaning the past for matching memories.

It seemed a day of accruing fascinations. Before us, a woodcock twittered drunkenly away into the dusk. The shadow of a squirrel scampered up a fallen log, rattled up a tree and darted into a hollow. In the soft sand of the creek bed were tracks of mink, coon, muskrat and deer; in the worn mud of the bank, a beaver race. A travel of wood ducks slipped by, swallowed quickly into the chalky sky. Doves whimpered in and out of the pines ahead, and on the distance floated the melodic peal of homing geese. The evening was begging closure.

It started just then—first an ambiguous whisper against the leaves, then a flurry against the gray, green boughs of the pines. Arrested by its arrival, we waited there as the first snow of winter grew. Softly, quietly, it hissed, thickening until the woods drew close, until it lay finely upon our shoulders and burgeoned into broadening white patches on the forest floor. Finally the flakes descended in large, icy clusters which shadowed the air and expired in wet caresses against our faces.

We reached the truck aglow with exuberance, thankful for the moment in time. Meg wallowed in the snow with absolute abandon, rolling and writhing and snorting in utter bliss.

I handed my gun to Jim, sprawled beside her and wallowed, too.

Shortly afterward the snow subsided, dwindling to a diminutive shower, then lingering briefly in wispy, occasional shards until it was gone. Sadly, we watched it away, climbed into the truck and drove to the cabin.

As we sorted and stored guns and gear, only the parting remained. Scott busied himself with dressing our modest bag of birds. Jim backed to a porch column, stared off across the muting fields and pulled a pipe. I wiped and studied the Parker.

It was more than the captivation of reinvigorated friendship or the feeling of a recently shared adventure. Strangely, the day still held us, and seemed not truly spent. The sky was dark gray; the air was musky with earth scent. The sparrows were clustering in the cedars, talking of roost. Yet, the deep of dusk oddly tarried.

For me, it was the rising sheen on the barrel of the gun that signaled its forthcoming, for Jim the gradual reversal of color upon the fields and for Scott the extraneous illumination in the nearby sedge. And one by one, we were casually summoned to its source.

Inexplicably, light was growing to the south, bleeding slowly through the dense, gray clouds in delicate sweeps of pink, azure, apricot and lavender. The light swelled like blotted ink stains that deepened into buoyant layers of crimson, cobalt, turquoise and purple. Then it spread across the horizon like billowing smoke. And upon its emerging center lay the bloated, orange crest of the dying sun. Above it glimmered a scattering of evening stars, and below it the silhouetted limbs of the oaks were filigreed against the twilight.

We watched in utter submission as the earth gathered the sun and passed slowly from sight, until only its very apex stood above the shroud of the horizon.

And still, the day would not submit.

Then in the dying rays of the sun, a rainbow arose. Born of the passing snowfall, in hues as soft as the breath of evening, it stood in a great prismatic crescent across the cleansed sky.

"How would you ever paint it, Dad?" Scott asked meekly.

"Paint it to memory, Scott," Jim replied.

We were beyond further speech. At last, night closed, and humbly we turned homeward.

As the headlights caught the yellow dirt of the outgoing farm path, I caught myself thinking that the highest occasions of the sporting life are invariably brief. They rise somehow on a staircase of perfect moments and transpire so exquisitely that for the rest of our days we cannot hope to explain them; we can only say that they happened.

A hunt is never perfected by the volume of its bag, only by the singularity of its memory.

At home again, Meg at heel, I trekked for the house, immersed in it all. 'Retta was at the kitchen sink. I kissed her deeply without a word, and left her wondering. As I made my way to the gun room and glanced at the calendar on the wall, I was reminded that it was January.

Funny.

It still felt a lot like Christmas. ⊠

"We chose not to follow the singles for fear of scattering them more. Evening was close and carried with it the threat of weather. Reluctantly, we left the little headland and wandered easily back up the bottom, talking happily of this day and others, gleaning the past for matching memories."

N.C. ARCHIVES AND HISTORY

JOHN LAWSON'S *Legendary* JOURNEY

When the young English adventurer John Lawson explored the Carolinas in 1701, he found a natural world teeming with wildlife and Indians. His book still opens a window on that lost world.

written by Eric G. Bolen ©1998

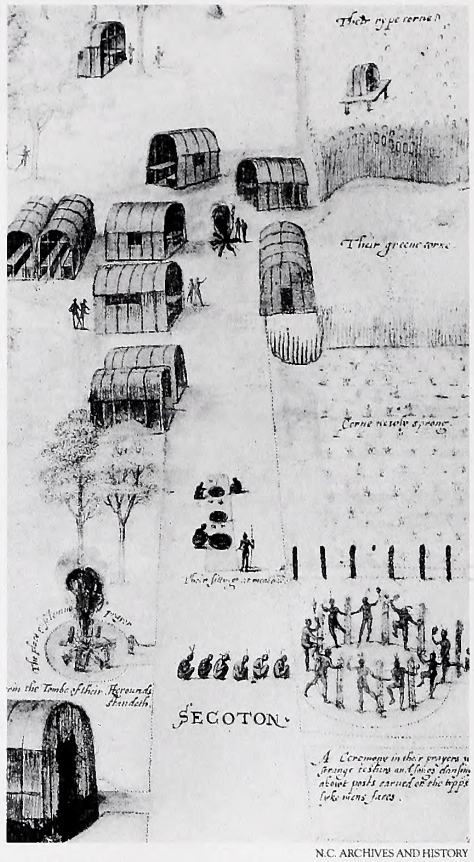
In the spring of 1700, John Lawson stood on the brink of a major decision. Born on Dec. 27, 1674, the son of Dr. John Lawson, who owned estates in Yorkshire, England, young Lawson toyed with the idea of going abroad, perhaps to Europe. He wanted to travel, like most well-to-do young men of the era, but he wasn't sure where. Perhaps to Rome, for a religious jubilee. Perhaps a grand tour of the Continent. But his indecision was resolved when he ran into a gentleman who "assur'd me, that Carolina was the best Country I could go to; and, that there then lay a Ship in the Thames, in which I might have my Passage. I laid hold on this Opportunity. . . ."

Lawson impulsively sailed for the New World immediately, arriving in New York three months later. After two weeks of provisioning, the vessel set sail for Charleston, then called "Charles Town," a 9-acre "metropolis of South Carolina." Arriving in late summer, Lawson disappears from the historical record, appearing later that year when the Lords Proprietors hired him to reconnoiter the backcountry, which was unknown to all but a few Indian traders and, earlier, to gold-seeking Spaniards.

Thus began, almost whimsically, one of the great adventures of colonial times. Lawson indeed laid hold on his "Opportunity," following it to places he never could have imagined

A strange wilderness *abounding in new species of wildlife, plants and trees as well as tribal groups of indigenous people greeted explorer John Lawson in 1700 as he set forth on his long journey through the Carolinas.*

F. EUGENE HESTER



N.C. ARCHIVES AND HISTORY

***Among Lawson's** greatest achievements are his observations and descriptions of Indian life before Europeans began to flood the country. Lawson noted how they made war, how they hunted and fished and the structures in which they lived. Engravings of the very early watercolors of John White, painted in 1585 and 1586, show some of the scenes of Indian life that Lawson observed. Among the fishing methods shown below are a fish weir (upper left corner), spearing fish and using fire in dugout canoes to spot fish at night. At right, White's painting of an Indian village in Virginia includes dwellings, agricultural fields and palisades.*

N.C. ARCHIVES AND HISTORY

back in England—through the trackless wilderness of the Carolinas, through the forest dominions of Indian tribes heretofore undocumented, into the presence of strange new animals few had ever seen. Lawson's impulsive decision to come to the New World led to the founding of the new coastal North Carolina towns of Bath and New Bern, to the writing of an extraordinary book—*A New Voyage to Carolina*—that is still studied for its keen observations on the unspoiled Carolina wilderness, and to a horrible death that, strangely, he himself had described. All this before he was 38 years old.

On Dec. 28, 1700, John Lawson and a small company of companions boarded a large dugout canoe and paddled north from Charleston along the coastline to the mouth of the Santee River. On passing through the tidal creeks and marshes at Bull's Island, he noted a "...good Plenty of fowl, as Curleus, Gulls, Gannets, and Pellicans, besides Duck, and Mallard, Geese, Swans, Teal, Widgeon, etc." Lawson had in fact cataloged the very resources that more than two centuries later became the reason for establishing the Cape Romain National Wildlife Refuge at the same spot. Here, too, 20th-century biologists breed red wolves, now making a comeback after brushing the sharp edge of extinction.

Lawson continued up the Santee, then abandoned his canoe and trekked overland, eventually entering North Carolina near Waxhaw sometime between Jan. 19 and 21, 1701. He called the country he traversed "delicious," and continued traveling northward up the Yadkin River Valley, then followed a route passing near present-day Lexington and High Point, where he turned eastward toward Hillsborough. His route continued toward modern-day Goldsboro, then swung slightly northeast to the Greenville area before resuming its eastward course. On Feb. 24, 1701, Lawson and his small party—most of his original group had separated earlier and headed for the comforts of Virginia—reached the English settlements near present-day Washington on the "Pamptico ugh River" where his travels ended. Thus ended Lawson's self-proclaimed "thousand miles travel," a 57-day trip—some reckon the interval at 59 days—that, unless twists and turns are included actually covered a route of about 550 miles. Charmed by the coastal area, he later cofounded and surveyed North Carolina's first chartered town, Bath, and a bit later, New Bern, the state's second municipality.

About half of Lawson's journal, which appears in the first third of *A New Voyage*, concerns his travels in South Carolina. The balance deals with North Carolina. The remaining sections of his book—devoted to economic geography, natural history and

ILLUSTRATED BY LEE RATCLIFFE

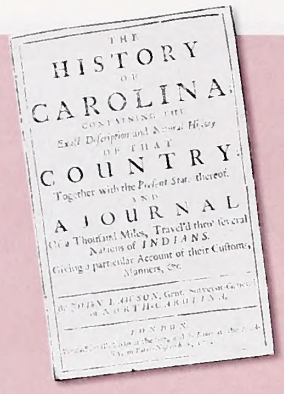
Beginning in *Charleston, in present-day South Carolina, Lawson traveled up the Santee River, then overland to the Yadkin River Valley and into present-day North Carolina. He and his companions turned east near High Point, passing present-day Hillsborough, Goldsboro and Greenville before ending his travels in Washington. The 57-day journey covered nearly 600 miles.*

Indian culture—deal almost exclusively with North Carolina, although his annotated lists of birds and other organisms incorporate observations from both states. Thus, in most of *A New Voyage* Lawson provides "my reader a Description of that Part of the Country only, which lies betwixt Currituck and Cape-Fair [Fear]...and this is commonly call'd North Carolina." Lawson nonetheless correctly anticipated that exploration of the mountainous parts of North Carolina would yield "a great number of Discoveries made by those that shall come hereafter...and made Enquiries therein."

Lawson's keen observations of bald eagles foretold later difficulties concerning their contamination with lead shot. Lawson wrote, "The bald Eagle attends the Gunner in Winter...and when he shoots and kills any fowl, the Eagle surely comes in for his Bird; and besides, those that are wounded, and escape the Fowler, fall to the Eagle's share." In short, Lawson noted that bald eagles regularly feed on wounded ducks, thereby ingesting shot embedded in the carcasses and succumbing to secondary poisoning.

Lawson also was the first to record the ecological relationship between fire and the feeding ecology of snow geese overwintering on coastal wetlands. Great flocks of these "white Brant" fed heavily on the "roots of Sedge and Grass" on newly burned "marshes and savannas, which they tear up like Hogs," and he recommended burning as the best way to hunt for snow geese so that "you can kill what you please of them." Lawson thus presaged by nearly 250 years the now common management practice of burning winter habitat to improve the food resources available to geese.

Despite Lawson's education and keen eye, he sometimes stumbled when dealing with basic zoology. Reptiles, for instance. He "rank'd these among the Insects, because they lay Eggs, and I did not know well where to put them" in a classification system. Nonetheless, he correctly identified the three species of sea turtles that visit our shores—the now-rare green and hawksbill sea turtles as well as the more common loggerhead. The first two, he noted, possessed "extraordinary Meat" but "scarce any one covets" the loggerhead "except be it for the Eggs." Lawson also offered an interesting, but hardly


THE
HISTORY
OF
CAROLINA
CONTAINING THE
Exact Description and Natural History
OF THAT
COUNTRY:
Together with the Present State thereof.
AND
A JOURNAL
Of a Thousand Miles, Travel'd thro' several
Nations of INDIANS.
Giving a particular Account of their Customs,
Manners, &c.
BY JOHN LAWSON, Gent. Surveyor General
of NORTH-CAROLINA.
LONDON

History of Lawson's *A New Voyage*

John Lawson departed North Carolina on Feb. 9, 1709, for Hampton, Va., where he sailed to England on a two-fold mission. First, he hoped to publish the extensive journal he kept while exploring the Carolina backcountry, supplemented by additional information he obtained after completing his 1700-1701 expedition. He also wished to plan for further settlement of what is today New Bern.

On reaching London, Lawson found a willing publisher in John Stevens, a prominent scholar who presented the work in serial form; the first installment appeared in April 1709. Stevens rushed the schedule, preempting another manuscript already in progress, because of Lawson's pending return to North Carolina. Lawson, according to archivist Charles R. Holloman, apparently edited his work even while Stevens was setting type. Later in the year, after the series was completed, Stevens bound extra copies of each installment into a single volume, issued as *A New Voyage to Carolina; Containing the Exact Description and Natural History of that Country: Together with the Present State therof. And A Journey of a Thousand Miles travel'd thro' several Nations of Indians. Givinga Particular Account of their Customs, Manners, &c.* Stevens subsequently changed the title page to *The History of Carolina* in editions published in 1714 and 1718. Lawson returned to North Carolina on April 27, 1710, in the company of 300 immigrants headed for New Bern. He was killed by Indians the following year, thereby thwarting his ambitious plans to write a far larger work that was to deal with the natural history of all of Colonial America.

accurate, account of the hunting behavior of a long black "whipster," likely the black racer although a black-phase rat snake is another possibility. While the Whipster is "the best Mouser that can be [it also preys on] the Rattle-Snake, wheresoever he meets them, by whipping him to Death with his Tail." Moreover, "This Whipster haunts the Dairies of careless Housewives, and never misses to skim the Milk clear of the cream."

Similarly, he "heard it creditably reported" that if a rattlesnake struck a small tree in the morning, by 4 o'clock that evening the tree was dead, "the Leaves red and wither'd." In another lapse, Lawson fancied the ways raccoons hunt for crabs, namely "he lets his Tail hang in the Water [which] the crab takes for a Bait, and fastens his Claws therein, which as soon as the Raccoon perceives, he, of a sudden, springs forward...and brings the Crab along with him." Once out of the water, the crab lets go and Lawson's much too clever raccoon enjoys a fresh seafood dinner!

Lawson, as did later naturalists of the 18th and 19th centuries, couldn't avoid mentioning the awesome numbers of passenger pigeons that once thrived in the mast-rich forests of eastern North America. While in the Yadkin River area, "we went to shoot Pigeons, which were so numerous in these Parts, that you might see many Millions in a Flock; they sometimes split off the Limbs of stout Oaks, and other Trees, upon which they roost 'o Nights." So plentiful were these birds that small Indian villages might have "100 gallons of pigeon oil, or fat [to use] as we do Butter." To secure such bounty, the Indians "take a Light, and go among them in the Night, and bring away some thousands, killing them with long Poles, as they roost." The droppings of the birds "commonly [lie] half a Foot thick" which made the "Ground as white as a Sheet...At this time of the Year [mid-winter], the Flocks, as they pass by, in great measure, obstruct the Light of the day." Tragically, these multitudes are gone forever, the casualties of relentless market hunting that followed European settlement of the deciduous forests from North Carolina to Wisconsin.

Wild turkeys—"turkies" to Lawson—also roosted in flocks unheard of today. These "pearch'd upon such lofty Oaks, that our Guns would not kill them, tho' we shot very often, and our Guns were very good. Some of our Company shot several times, at one Turkey, before he would fly away, the Pieces being loaded with large Goose-shot." Lawson reported seeing flocks of "several hundreds in a Gang," one of which numbered 500 strong and included birds so large that half a turkey could feed eight hungry men two meals. Large indeed, although the reader must remember that Lawson was also a colonial "developer," attempting to attract new settlers to North Carolina with stories of the natural abundance of the land.

Lawson acquired great respect for alligators, which "are very mischievous to the Wares [weirs] made for taking Fish, into which they come [to feed and] cannot readily extricate themselves, and so break the Ware to Pieces ....They roar, and make a hideous Noise [and] in these Parts, sometimes exceeds seventeen feet long." Lawson once "was pretty

***Lawson made** interesting, although not always accurate, observations of the wildlife he found. One accurate observation was of snow geese feeding among the burned husks of marsh grass. Wildlife managers today use burning to improve food conditions for wildlife.*

JACK DERMID

N.C. ARCHIVES AND HISTORY

Lawson and two *companions, Christopher von Graffenreid and an unnamed slave, were captured by hostile Tuscarora Indians in 1711 as the three men explored the Neuse River. His two companions were eventually released, but Lawson was tortured and killed. Von Graffenreid, the founder of New Bern, drew the scene of their capture and trial, above.*

much frightened by one" that built a nest under a house he built on a fork in the Neuse River near New Bern. One night, while alone at the fireside with his dog, Lawson experienced "such a roaring, that he made the House shake about my Ears." His dog, too, "was frightened out of his senses." At first, Lawson thought the roar of "this ill-favour'd Neighbour of mine" was a trick of Indians who might be "working some Piece of Conjuration under my House." Later in the evening, an Indian companion returned and, after laughing at Lawson and his fears, "presently undeceiv'd" him as to the real cause of the ruckus. In telling this story on himself, Lawson suggests another side of his character —a sense of humor—but on a more utilitarian bent, he noted how the teeth of dead alligators made "chargers" [ramrod tips] for loading guns and, because the teeth came in various sizes, were "fit for all loads."

Lawson befriended the Indians he encountered in his travels, and he stoutly championed their fair treatment by Europeans. In *A New Voyage*, he faithfully described Indian customs, including the Tuscarora's "cruelty to their Prisonors of War [as] a natural Failing because they strive to invent the most inhumane Butcheries for them, that the Devils themselves could invent, or hammer out of Hell." Such tortures were designed to prolong life as long as possible. Among these was to impale a victim with pitch-laden splinters of pine, thus producing a human porcupine, then lighting these "which burn like so many Torches; and in this manner, they make him dance round a great Fire, every one buffeting and deriding him, till he expires." Ironically, after Lawson was captured during an Indian uprising in 1711, he apparently suffered death by the very technique he had earlier described, although other reports maintain that the Tuscaroras simply cut his throat.

By any measure, Lawson left a rich legacy—an extraordinary if not always accurate account of a time when North Carolina was little more than wilderness. *A New Voyage* stands as a landmark, and yet Lawson knew he had observed only a brief part of the region's biological wealth. In his words, "...there will be a great number of Discoveries made by those that shall come hereafter [and] when another Age is come, the Ingenious then in being may stand upon the Shoulders of those that went before them, adding their own Experiments to what was delivered down to them by their Predecessors, and then there will be something towards a complete Natural History." John Lawson indeed provided broad shoulders from which many later gained not only a splendid view of nature but also the spirit of a new land. Carolinians should be thankful that he passed our way. ⊠

The leaves are gone and the branches are bare.

What Do You See When You Look at a Tree?

Look at the tiny ***buds*** *on a tree twig: next year's growth of new leaves and flowers is neatly miniaturized and formed even before the onset of winter.*

beech

A hand lens or magnifying glass is handy for viewing tree twigs up close.

white oak

tulip poplar

Trees can be identified by the form of their buds. On older trees that have shed leaves, look for the ***leaf scar****. Unique to each kind of tree, leaf scars may be shaped like horseshoes, hearts, shields, circles, crescents or even tiny faces.*

walnut

shagbark hickory

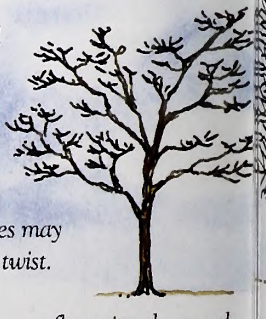
The bark of mature trees is a good identification tool. Is it thick, thin, smooth, rough or warty? Is it shaggy or does it peel? What color is it?

When winter comes, temperatures drop and days grow shorter. Some birds fly to warmer climates, while some mammals find dens and sleep through the cold months. Other animals stay active, grow warmer coats and make it through lean times as well as they can. Like animals, trees have ways to survive through winter months.

During spring and summer, water and nutrients from the soil are transported through a tree's **sapwood** and into its leaves. The leaves are the tree's solar panels: they gather sunlight. Using that solar energy, the leaves combine water and nutrients with carbon dioxide from the air to make food for the tree to survive and grow. During this process of **photosynthesis** trees release oxygen into the air, and they also **transpire**, or lose water through their leaves.

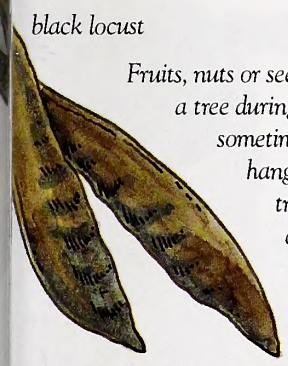
Winter is like a time of **drought** for many trees, because water from the soil is not as readily available to them as it is during warmer weather, especially if it comes in the form of ice or snow. When

Winter is a wonderful time to look at the unique forms and shapes of trees. Trees in the open may grow wide and full, while those close to many other trees may have to stretch or twist.



flowering dogwood

written by Carlton Burke and Consie Powell / illustrated by Consie Powell

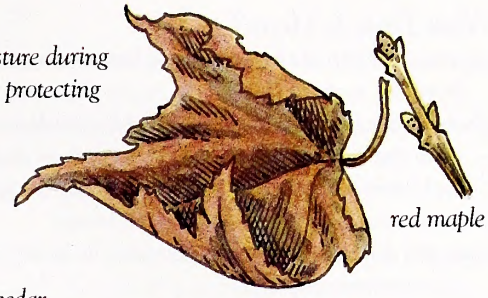


black locust

Fruits, nuts or seeds that formed on a tree during autumn are sometimes found still hanging from a tree's branches during winter.

sycamore

Deciduous trees conserve moisture during winter by shedding leaves and protecting their buds with scales.



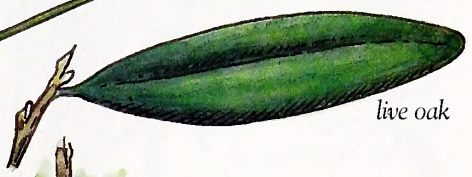
red maple

red cedar

Evergreen trees reduce water loss through thick leaves or needles with a waxy covering.

holly

white pine



live oak

light levels are low and temperatures are near or below freezing, photosynthesis stops or becomes very inefficient. To avoid losing too much water through transpiration, trees have evolved several survival strategies. **Deciduous** trees shed their unneeded leaves and become **dormant**. **Evergreens** keep their leaves, but these leaves are covered with a thick, waxy covering that prevents the loss of too much water. Deciduous trees are very efficient at photosythesis when plenty of water is available, but shed their broad leaves during winter in order not to dry up and die. Evergreens are less efficient at photosysthesis than deciduous trees, but can extract soil moisture better under marginal conditions and can carry out some photosynthesis even during winter.

Although trees shut down in wintertime, they are far from being dead. They will be ready to grow again when warm weather returns. Take a walk outside; winter can be one of the best times of the year to take a close look at some trees.

Evergreens, like fir or hemlock, block cold winter winds and trap heat to provide a welcome shelter to wildlife.

eastern hemlock

red maple *river birch* *sourwood*

Fraser fir

Evergreens that grow where snow falls regularly during winter tend to be species with strong, vertical trunks and shapes that shed snow without breaking.

What Does It Mean?

sapwood: the inner bark of a tree that carries water and minerals from the roots to the leaves

photosynthesis: process by which chlorophyll in a leaf uses energy from the sun to convert water and carbon dioxide into sugars and other substances that enable a plant to grow

transpiration: the loss of water from leaves

drought: an extended dry period with little or no rainfall or other precipitation

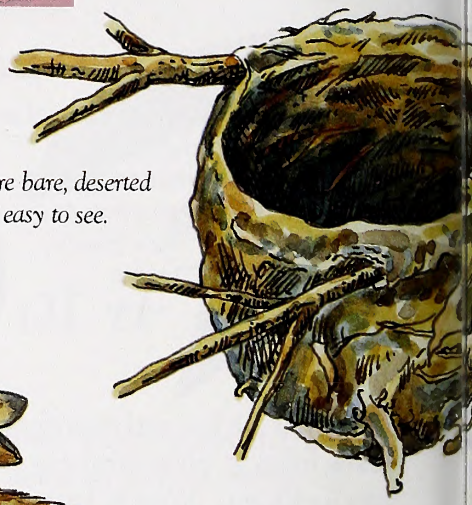
deciduous: shedding leaves in the autumn and growing new leaves in the spring

dormant: the suspension of normal growth and activitiy, which can be resumed at a later time

evergreen: holding leaves that remain green through winter

buds: young, undeveloped leaves and flowers often covered by one or more protective scales

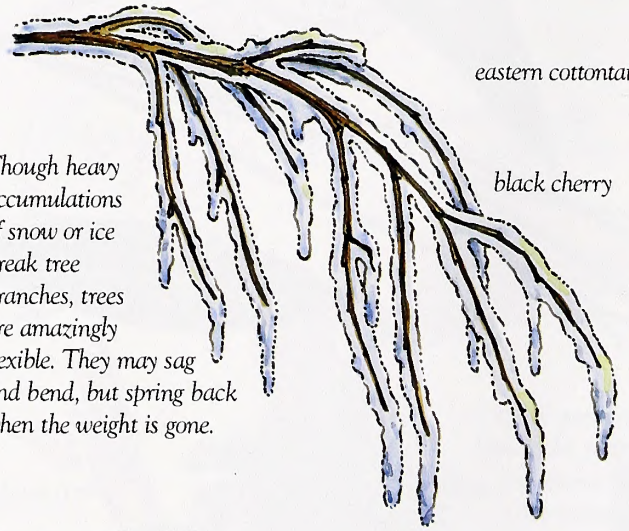
leaf scar: the marking at the point of attachment left on a stem when a leaf falls off



When trees are bare, deserted bird nests are easy to see.

Deer, rabbits and mice feed on the twigs and buds of trees and shrubs during winter.

eastern cottontail rabbit



black cherry

Though heavy accumulations of snow or ice break tree branches, trees are amazingly flexible. They may sag and bend, but spring back when the weight is gone.

Read and Find Out

- *The Book of Forest and Thicket* by John Eastman, Stackpole Books, 1992.
- *A Field Guide to Trees and Shrubs* by George A. Petrides, Houghton Mifflin Co., 1986.
- *A Guide to Nature in Winter* by Donald W. Stokes, Little, Brown and Company, 1976.
- *Into Winter: Discovering a Season* by William P. Nestor, Houghton Mifflin Co., 1982.
- *Trees and Leaves* by Rosie Harlow and Gareth Morgan, Warwick Press, 1991.

In *Wildlife in North Carolina*:

- "Winter's Hidden Promise" by Lawrence S. Earley, February 1983.

Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon.

red-eyed vireo nest

Cavities and hollows in older trees provide warm, well-insulated dens.

southern flying squirrels

Get Outside

Go *outside* with a field guide or other book to help you identify winter trees. Start with trees in your own yard or neighborhood.

Look for browse marks. Animals that feed on winter buds and twigs will leave tell-tale marks on bare branches. Imagine you are a hungry mouse, rabbit or deer: that will tell you what height to snoop in order to find tooth marks.

Make bark rubbings. Hold a piece of paper firmly against the bark of a tree as you rub a broad area gently with the side of a crayon. After you have done this for several different trees, label them so you will remember the trees' distinctive bark patterns.

Visit the Museum: Join Saturday Storytime for special tree stories: *The Snow Tree* by Caroline Repchuk and *The Grandpa Tree* by Mike Donahue. Then, examine some evergreens and make your own minature evergreen corsage or boutonniere. Saturdays, 2:30-3 p.m. All programs are free. North Carolina Museum of Natural Sciences. For more information, call (919) 733-7450.

The bright red berry clusters of a dogwood are especially good food for many song birds and squirrels.

cardinal

It's WILD!

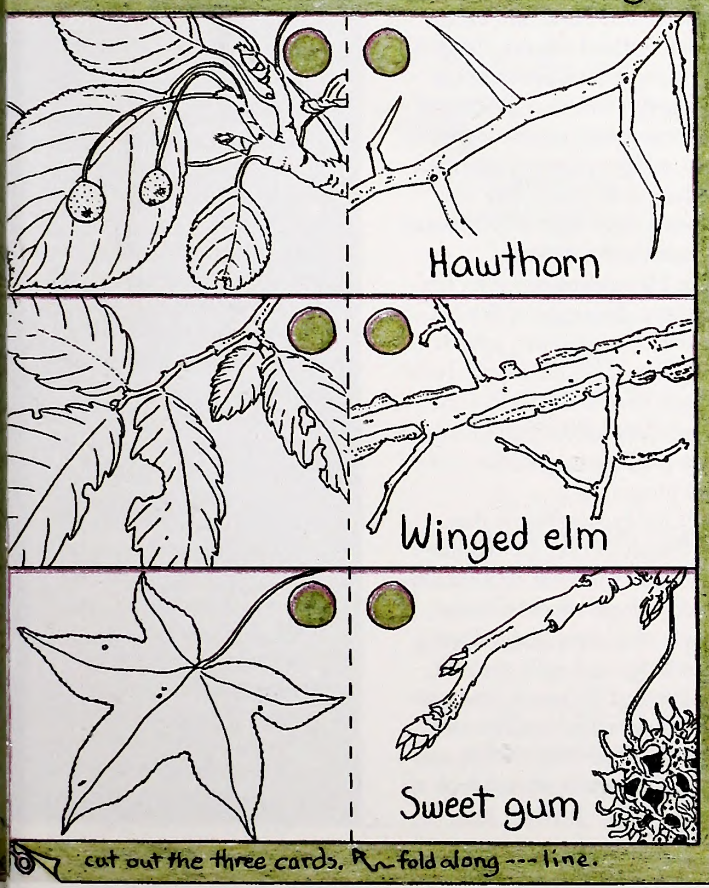
Project WILD Activities for teachers and students that correlate to this topic include:

Wild Words... A Journal-Making Activity: teaches students to observe and describe their surroundings, especially out-of-doors.

Shrinking Habitat: teaches students to recognize some effects of human development of land areas on plants and animals previously living in the area.

Playing Lightly on the Earth: teaches students to distinguish games that are damaging and not damaging to the environment.

Photocopy the three cards below on cardstock. Color and cut out. Fold each card. Punch holes, and thread with colorful strings.



Get WILD

State Environmental Education Conference: Feb. 10-13, 1999, at the Sheraton Imperial Hotel, Research Triangle Park. Opportunity for participation in EE Certification-approved 10-hour Project WILD and Aquatic WILD workshops. For workshop registration, contact Celeste Wescott Maus at (919) 733-7123, ext. 261. Pre-registration for conference workshops required. For conference information, call Judy Pope at 1-800-482-8724.

Advanced Aquatic Wild Workshops for educators in selected Piedmont counties: Feb. 26-27–*Salamanders: To Know Them Is to Save Them*. Registration contact: Donna Rogers, (919) 541-5478.

Wildlife Commission Honors Lives Lost in the Line of Duty

MELISSA McGAW

***David McCall,** son of Dewie McCall, a wildlife officer who was killed in the line of duty in 1971, accepts a North Carolina flag from Col. Roger LeQuire, with the N.C. Wildlife Resources Commission's Enforcement Division. The Wildlife Commission recently dedicated a memorial at the new Pisgah Center for Wildlife Education to the memory of commission employees who have lost their lives in the line of duty.*

Edited by Chris Powell

In the half-century history of the N.C. Wildlife Resources Commission, 10 employees have lost their lives in the line of duty. The Wildlife Commission recently honored those sacrifices by dedicating a monument at the entrance to the agency's newly constructed Pisgah Center for Wildlife Education, located near Brevard.

Addressing the audience during the ceremony, Wildlife Enforcement Col. Roger LeQuire said the dedication of the memorial was a fitting tribute to the men who gave their lives for the principles of wildlife conservation.

"This is a solemn, yet historic and hopeful day," LeQuire said. "Solemn—because we are here to dedicate this memorial to those individuals who died in the line of duty, making the ultimate sacrifice. Historic—because their names will forever be associated with the Wildlife Commission's first education center. And hopeful—that, through education and public awareness, no more names will ever be added to this memorial."

Following a reading of the names from the stone memorial, the Wildlife Commission honor guard presented surviving family members with folded North Carolina flags. The ceremony's closing was punctuated by a lone bugler sounding "Taps," followed by a lone bagpiper, playing "Amazing Grace."

Amelia McCall, widow of Refuge Manager Dewie McCall, said she appreciated the recognition given to her former husband. "I am very touched," McCall said. "It has been 27 years, and the Wildlife Commission still remembers him. Wildlife was his life. Anybody who knew him said he had more friends than he had enemies, even though he was a game warden. When he wrote someone a citation, he would talk to them and almost make them feel glad they got it."

The ceremony also served as the official opening of the Pisgah Center for Wildlife Education, located in the Transylvania County portion of the Pisgah National Forest. Funded primarily by the N.C. Wildlife Endowment Fund and other wildlife-related sources, the project represents a partnership among sportsmen, conservationists, businesses, private organizations and government agencies. To date, volunteers have contributed more than 10,000 hours to develop the facility.

In his opening remarks, Jim Bennett, chairman of the N.C. Wildlife Commission, said that more than 215,000 people have already toured the facility and more than 8,600 indviduals have participated in the center's programs.

"Our expectation is that the Pisgah Center for Wildlife Education will soon be a national educational model to assist people of all ages in developing knowledge and skills to result in informed decisions, responsible behavior and constructive actions concerning wildlife and the environment upon which all life depends," Bennett said.

This memorial is dedicated to the employees of the N.C. Wildlife Resources Commission and others who have given their lives in service to the agency and to the conservation of North Carolina's valuable wildlife resources. We pray that the list of names will remain short.

- Joseph D. Whitaker, Game Warden—Nov. 15, 1936—believed to be fatally wounded by a person who had been using a spotlight to hunt deer.
- W.I. Wright Jr., District Game & Fish Protector—Oct. 31, 1948—fatally wounded by hunters during a license check.
- Grover C. Quinn Jr., Division of Game—March 25, 1949. (No other information could be found regarding Mr. Quinn.)
- William G. Holler, Wildlife Protector—Oct. 19, 1951—killed in an automobile accident while carrying out his law enforcement duties.
- Amos M. Bordeaux, Wildlife Protector I—April 10, 1962—killed accidentally during what appears to have been target practice.
- John O. Edwards, Wildlife Protector—Aug. 3, 1963—fatally injured while in route to a call when his vehicle collided with a bus.
- Dewie H. McCall, Wildlife Refuge Manager II—Sept. 5, 1971—fatally shot in an ambush by a fisherman to whom he had issued a citation.
- Troy M. Sigmon, Wildlife Enforcement Area Leader—Sept. 1, 1978—suffered fatal injuries when the helicopter in which he was flying crashed while he was looking for baiting violations.
- Lloyd O. Mayse, Wildlife Enforcement Officer II—Nov. 27, 1980—fatally shot while attempting to arrest two suspects.
- William A. Williamson, Wildlife Enforcement Officer I—Dec. 4, 1985—fatally injured in an auto accident while en route to assist a fellow officer.

1999 N.C. Duck Stamp to be Unveiled

With all the drama of a beauty pageant, the original painting of the 1999 North Carolina Duck Stamp will be revealed for the first time at the East Carolina Wildlife Arts Festival.

The festival and North Carolina Decoy Carving Championship will be held 9 a.m. to 6 p.m. Jan. 30 and 10 a.m. to 4 p.m. Jan. 31 at the Civic Center in Washington, N.C.

Sponsored by the East Carolina Wildfowl Guild, the two-day event will bring together some of the nation's best wildlife artists, carvers and related exhibitors. Highlights of the weekend will include the state decoy carving championships (11 a.m. Sunday) and a wildlife art and decoy auction.

The N.C. Wildlife Resources Commission's duck stamp and print program was initiated in 1983 to raise funds for waterfowl conservation in the state, including acquiring and improving habitat. Purchase of stamps was voluntary until 1988. Since then, North Carolina waterfowl hunters have been required to buy a state stamp in addition to the federal duck stamp.

Money from the sale of state stamps and prints goes into the Wildlife Commission's waterfowl fund, which has raised more than $3 million since it began. The fund has helped in the purchase and improvement of thousands of acres of valuable wetlands, including Conine Island in Bertie County, Hunting Creek Swamp in Davie County and the White Oak Impoundment in Onslow County.

State waterfowl stamps go on sale July 1 for $5 each. Prints can be purchased from independent art dealers for $141.

For information about the festival, contact show chairman David Gossett at (252) 946-2897.

Field Notes

Eastern Gun Deer	Through Jan. 1
Central Gun Deer	Through Jan. 1
Western Gun Deer	Through Dec. 12
Northwestern Gun Deer	Through Dec. 12
Black Bear	See *Regulations Digest*
Wild Boar	Dec. 14-Jan. 1
Gray Squirrel	Through Jan. 30
Fox Squirrel	See *Regulations Digest*
Rabbit	Through Feb. 27
Pheasant	Through Jan. 30
Fox	See *Regulations Digest*
Raccoon and Opossum	See *Regulations Digest*
Common Snipe	Through Feb. 27
Ruffed Grouse	Through Feb. 27
Mourning Doves	Dec. 19-Jan. 14
Woodcock	Dec. 18-Jan. 16
Crow	See *Regulations Digest*
Bobcat	See *Regulations Digest*

The 1999 North Carolina Wildlife Calendar is Here!

Raney G. Roger's "Cardinals in Winter" is one of 12 fine paintings featured in the 1999 North Carolina Wildlife Calendar. Order now before they're sold out.

The works of Mark P. Slawson, James A. Brooks, Robert B. Dance, Dempsey Essick, Duane Raver, Raney G. Rogers, David Williams, Robert C. Flowers Jr., Brian Edwards and Joe Seme are featured in the 1999 North Carolina Wildlife Calendar.

Order yours today! Payment must accompany your order. Calendar orders may be charged to VISA or MasterCard, or enclose your check or money order (payable to NCWRC). Complete the form below and mail with payment to:

1998 Calendar, N.C. Wildlife Resources Commission
512 N. Salisbury Street, Raleigh, N.C. 27604-1188
(Office is located at 322 Chapanoke Road in Raleigh.)

GREAT CHRISTMAS GIFT!

Please send me _____ Calendars at $6.00 each . . . . . .$_____

All N.C. residents add $.36 sales tax per calendar . . . . . _____

☐ Enclosed is my check for **total** payment of . . . . . .$_____

☐ Charge to MasterCard or VISA for the calendar(s) ordered above. My card number is _____ and the expiration date is _____/_____.

_____ (_____)_____
Card holder signature | Day Time Phone No.

If ordering 7 or more calendars, please provide your UPS deliverable address.

Name _____

Address _____

City/State/Zip_____

Phone (_____) _____

All orders must be prepaid. A $20 charge will be made on returned checks (N.C.G.S. 25-3-512). **For fund raising and bulk rate information (10 calendars or more), call 919-662-4377. Please allow 6 weeks for delivery.**

CAL099

Magazine Gets Toll-Free Phone Line

Do you have some last-minute Christmas shopping to do? Now you can order gift subscriptions of *Wildlife in North Carolina* through the North Carolina Wildlife Commission's toll-free phone line. Just dial 1-888-248-6834 and give the operator your order. Acceptable forms of payment, by phone, include VISA and MasterCard.

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

Dec. 5-6

Do you want to learn more about North Carolina's waterfowling heritage? The 11th annual Core Sound Decoy Festival will be held at Harkers Island Elementary School on Harkers island. The festival will feature old and new decoy exhibits, carving demonstrations and competitions, educational exhibits as well as coastal food and drinks. For more information, call the Core Sound Waterfowl Museum at (252) 728-1500.

Dec. 5-6

The Swan Days Festival will be held at the Mattamuskeet Lodge on the Lake Mattamuskeet National Wildlife Refuge. The event will feature workshops, historical presentations, arts and crafts, lectures and children's activities. In addition, one-hour, guided tours of refuge areas not normally open to the public will be available for $7 by reservation. Reservations for the tours can be made after Nov. 16 by calling (252) 926-4021. For festival information, call Margie Brooks at (252) 926-9311.

Dec. 18

The Alligator River National Wildlife Refuge will sponsor the 1998 Red Wolf Howling Safari at 6:30 p.m. at the Alligator River Refuge. The safari will begin at the Creef Cut Wildlife Trail, located 20 minutes from Manteo on U.S. 64 between East Lake and Manns Harbor in the Alligator River Refuge. Participants will learn about red wolves and can participate in an actual "howling." For more information, call Michael Morse at (252) 473-2557.

1998-99 Waterfowl Bag Limits, Shooting Hours and Season Dates for Waterfowl

See the current *North Carolina Inland Fishing, Hunting & Trapping Regulations Digest* for other regulations concerning waterfowl.

BAG LIMITS

Conventional bag: Six ducks daily with no more than one black duck (black duck season closed until Dec. 1), four mallards with no more than two hens, two wood ducks, two redheads, four scaup, one fulvous tree duck, one mottled duck, one canvasback or one pintail. There will be no season for harlequin ducks.

Other limits: a) 15 snow geese
b) 2 brant
c) 5 mergansers (one may be a hooded merganser)
d) 7 sea ducks (4 scoters) in special sea duck areas only
e) 15 coots

SHOOTING HOURS

One-half hour before sunrise to sunset

SEASONS

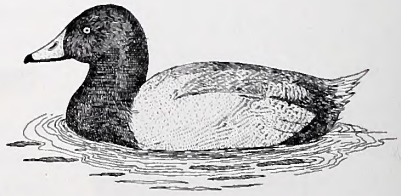
Ducks, Mergansers and Coots: Through Jan. 20

Sea Ducks: Through Jan. 20

Snow and Blue geese: Through March 10

Brant: Through Jan. 20

Swan: Through Jan. 30 (by permit only)



Special Youth Waterfowl Hunt Day: Jan. 23; Youths age 15 and under may hunt when accompanied by a properly licensed, non-hunting adult age 21 or over. Species include ducks, mergansers and coots.

You may also call 1-800-675-0263 for this information.
Report all bands by calling 1-800-327-BAND

Wildlife Officer "Nets" Award

GARY BROOME

***Sgt. Tony Robinson** (right) with the North Carolina Wildlife Resources Commission, was recently recognized by the North American Wildlife Enforcement Officers Association for his volunteer work connecting wildlife officers worldwide through the Internet.*

A North Carolina Wildlife Enforcement officer was recently recognized for his volunteer work connecting wildlife officers worldwide through the Internet.

Sgt. Tony Robinson, of Valdese, received an appreciation award from NAWEOA (North American Wildlife Enforcement Officers Association) and the 1998 IGW (International Game Warden) magazine fraternalism award. He also received a surprise appreciation award and gift from his "Game Warden Net" membership of officers.

"I'm humbled by my peers' recognition," Sgt. Robinson said. "Creating the web sites has been a labor of love for me. It is my way of doing that little extra something for wildlife conservation, my fellow officers and the public."

In his spare time for the past two years, Sgt. Robinson has designed and maintained the largest e-mail list-serve of wildlife enforcement personnel in the world. With 600 members from all around the globe, the "Game Warden Net E-mail List" has turned into a new communications tool for active and retired wildlife officers. This site enables officers, worldwide, to have instant access to information that would have been almost impossible to acquire otherwise.

Another aspect of Sgt. Robinson's Internet work is the "Game Warden's Place." This site provides officers as well as the public with various types of information relating to wildlife enforcement work. At the "Game Warden's Place" web site, the public can find a large collection of wildlife-related information, such as a list of North Carolina's deer seasons by county. The "Game Warden's Place" web site address is (http://www.hci.net/~decoydoc/).

—Courtesy of the N.C. Wildlife Enforcement Division

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through September 1998

Principal Balance
$26,429,859.46

Interest Earned
$26,413,994.15

Total Receipts
$52,843,853.61

Interest Used
$15,250,446.04

Fund Balance
$37,593,407.57

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Wildlife In North Carolina 1998 Index

Article	Author/Photographer	Topic	Issue
Art/Photo Portfolio			
Caught in the Act	Derrick Hamrick	Stop action photography	Jan.
Seasons of the Magnolia	Melissa McGaw	Magnolias	June
Song of the Seashell	Melissa McGaw	Seashells	July
Grasslands	Lawrence S. Earley	Grasses	Sept.
The Season of Color	various photographers	Fall scenes	Oct.
Made of Wood	Ron Mayhew	Wood carvings	Dec.
Commission Activities			
Girl Scouts Go WILD	Celeste Wescott Maus	N.C. WILD	Feb.
What Do We Do Now?	Celeste Wescott Maus	Advanced WILD	March
The Lady Wears Camo	Darcia Bondurant	BOW program	April
Heads Up for Poachers	Chris Powell	Deer poaching	Sept.
Conservation, Environment			
The Sandhills Quail Mystery	Terry Sharpe	Quail	Feb.
The Swamp That Burns	Lawrence S. Earley	Pocosins	Feb.
The Fire Next Time	Lawrence S. Earley	Fire	Feb.
Common Ground	Chris Powell	Protecting land	July
To Buy a Mountain	Lawrence S. Earley	Saving land	Aug.
Lost in Angola Bay	Rodney Foushee	Angola Game Land	Oct.
Twilight for Oysters	Rodney Foushee	Oyster decline	Nov.
Fisheries Management			
Little Lakes, Big Fish	Dan Kibler	Bodie bass	May
Hope for Currituck's Bass	Rodney Foushee	Currituck bass	July
Fishing, Freshwater			
The Accidental Perch	Pete Kornegay	Yellow perch	Jan.
Buzzbait Bassin'	F. Eugene Hester	Buzzbaits	Feb.
Flies and First-Day Trout	Jim Dean	Trout fishing	March
Carolina's Toothy Trophies	Bryan Hendricks	Muskies	April
Fly Fishing for Everything Else	Gerald A. Almy	Fly fishing	May
Smart Moves for Bass	Soc Clay	Bass fishing	June
Sweet Spots for Summer Crappies	Soc Clay	Crappie fishing	July
Fishing, Saltwater			
Floating Bubble with a Zap	David Lee	Portuguese man-of-war	July
Flies in the Salt	Joel Arrington	Saltwater fly-fishing	Aug.
Cape Lookout Adventure	F. Eugene Hester	Surf fishing	Oct.
Hunting, Big-Game			
Preserving a Southern Heritage	Chris Powell	Youth hunts	Aug.
Cool Moves for Hot Whitetails	Mike Gaddis	Deer hunting	Sept.
Mix Your Deer-Hunting Strategies	Gerald Almy	Deer hunting	Oct.
Hunting, Small Game and Waterfowl			
Banking Tomorrows	Mike Gaddis	Squirrel hunting	Aug.
Why I Hunt with My Kids (and other tall tales)	Dale Caveny	Squirrel hunting	Aug.
Boost Your Odds with Doves	David Hart	Dove Hunting	Sept.
Hunting Season Roundup, 1998-1999	Staff	Hunting seasons	Sept.
A Passion for Quail	Joel Arrington	Quail hunting	Nov.
My Best Duck Hunt	F. Eugene Hester	Duck hunting	Dec.
A New Year's Christmas	Mike Gaddis	Quail hunting	Dec.
Natural History and Wildlife			
Sing a Song of Redbirds	David Lee	Cardinals	March
God's Ponds	Jeff Beane	Carolina Bays	April
Green River Extravaganza	John Manuel	Green Riv. Game Land	May
A Confusion of Woodpeckers	Elizabeth Hunter	Bird watching	June
Discovering Crayfish	Harry Ellis	Crayfish	June
The World Is Full of Moths	Harry Ellis	Moths	Nov.
Forestry for the New Millennium	Lawrence S. Earley	Managing forests	Nov.
Nature's Ways			
After the Chestnut	Lawrence S. Earley	Chestnut blight	Jan.
The Cattail's Savory Success	Lawrence S. Earley	Cattails	Feb.
Stocking the Pantry	Jeff Beane	Food storage	March
Rattlesnake Tails	Jeff Beane	Snake rattles	April
The Parasitic Majority	Jeff Beane	Parasites	May
Declaration of Interdependence	Lawrence S. Earley	Freshwater mussels	June
Bringing Up Baby...Upside Down	Mary Kay Clark	Bats	July
Deep Sea Slime Machine	David Lee	Hagfish	Aug.
Shapes That Fit	Roger Powell	Animal bodies	Sept.
Poisonous or Venomous?	Jeff Beane	Chemical weapons	Oct.
The Penthouse Mouse	Mary Kay Clark	Golden mouse	Nov.
Everybody Here Has Hair	Roger Powell	Mammal hair	Dec.
N.C. WILD Notebook			
What's So Special About a Mouse	Consie Powell	Mice	Jan.
Big Fish Eat Little Fish	Consie Powell	Predatory fish	Feb.
What Do Old Trees Know	Consie Powell	Tree rings	March
Birds, Bees & Pollen!	Consie Powell	Pollination	April
Get Busy, Beaver!	Consie Powell	Beavers	May
Great Cycling Cicadas!	Consie Powell	Cicadas	June
Barrier Island Scavenger Hunt	Consie Powell	Coastal habitats	July
Meet Fisheries Biologist Shari Bryant!	Lawrence S. Earley	Fisheries biologist	Aug.
Glorious Grasses!	Anne Marshall Runyon	Grasses	Sept.
Night Flyers	Buffy Silverman	Bats	Oct.
Stalking Our Freshwater Mussels!	Consie Powell	Freshwater mussels	Nov.
What Do You See When You Look at a Tree?	C. Burke & C. Powell	Trees in winter	Dec.
North Carolina History			
Piedmont Patriarch	Eddie Nickens	Mason farm	Jan.
Outdoor Recreation			
The Firstest Aid of All	Burt Kornegay	First-aid	March
A Summer Vacation, Naturally	Chris Powell	Kid's vacation	May
Dancing with the Widowmaker	Burt Kornegay	Hiking pitfalls	Oct.
From Soup to Nuts	Staff	Sporting recipes	Dec.
Our Natural Heritage			
Still Worth the Trouble	Jim Dean	Dogs	Jan.
Collections Out of Control	Jim Dean	Sporting collections	Feb.
Pushing Your Luck	Jim Dean	Spring fishing	March
The Laughing Place	Jim Dean	Special places	April
Virtual Fishing	Jim Dean	Hookless fishing	May
Fishing's Top Thrill	Jim Dean	Fishing	June
A T'angling We Go	Jim Dean	Fishing tackle	July
Fishing the Big Pond	Jim Dean	Saltwater fishing	Aug.
Fishing's Fourth Level	Jim Dean	Fishing	Sept.
To the North Woods	Jim Dean	Maine	Oct.
The Neuse Under Falls	Jim Dean	Upper Neuse River	Nov.
A Recipe for Christmas	Jim Dean	Duck hunting	Dec.
Profiles, Personalities			
John Lawson's Legendary Journey	Eric Bolen	John Lawson	Dec.
Wildlife Management			
Tar Heels in Russia	Terry Sharpe	Russia	Jan.
Mapping the Future for Songbirds	Rodney Foushee	Songbirds	Feb.
Bald Eagle on the Comeback Trail	Rodney Foushee	Bald Eagles	March
A Dizzy Climb for the Wild Turkey	Jeff Samsel	Turkeys	April
Farming's Quiet Revolution	Carl Betsill	No-till farming	April
The Tropical Connection	interview with Mark Johns.	Neotropical songbirds	May
Living with Bears	Calvin H. Allen	Bears	June
Sanctuary	Phillip Manning	Colonial water birds	June
Too Many Deer?	Scott Osborne interview	Deer population	Sept.
Our Biggest Duck Club	Chris Powell	Duck impoundments	Nov.
Wildlife Through The Year			
Living with Endangered Species	Rodney Foushee	Endangered species	Jan.
February Fieldwork	Rodney Foushee	Habitat tips	Feb.
Preventing Deer Damage	Rodney Foushee	Nuisance deer	March
April Improvements	Rodney Foushee	Spring fieldwork	April
Attracting Migrants	Rodney Foushee	Migratory songbirds	May
Leaving Wildlife Babies Alone	Rodney Foushee	Wildlife babies	June
Building Better Bug Traps	Rodney Foushee	Bug traps	July
Cats and Wildlife	Rodney Foushee	Cat predation	Aug.
Planting for Wildlife	Rodney Foushee	Fall feed plots	Sept.
Fall Flooding and Stocking	Rodney Foushee	Flooding & stocking tips	Oct.
Fruit for Wildlife	Rodney Foushee	Trees, ducks, ponds	Nov.

N.C. WILD STORE

NEW!

Introducing the first poster in our "Sporting Heritage" series...

WATERFOWL DECOYS OF NORTH CAROLINA

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting are collected for the first time. This heavy-stock, framable poster is destined to become a collector's item. From private collections throughout the state, the artistic hand-carved decoys brilliantly evoke the days when waterfowl blackened the skies over eastern North Carolina. $10.

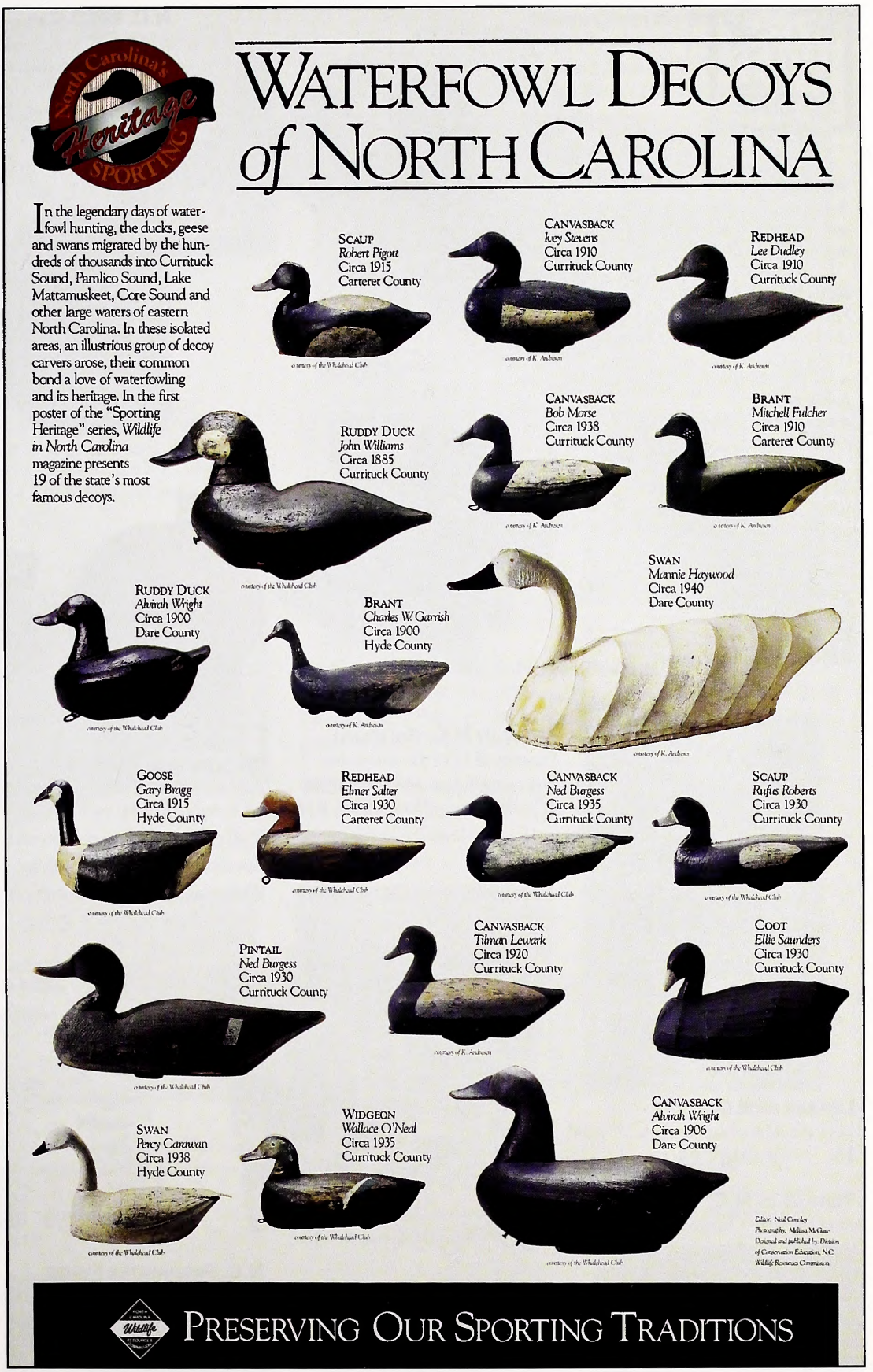
ITEM CODE **P12**

★★★★★★★★★★★

Other new items shown on page 38:

*Check out the latest in our colorful and informative nature posters—"**Frogs of North Carolina.**"*

Add to your wardrobe with two new styles of **Wildlife in North Carolina** *caps—choose from camouflage and blaze orange.*



More terrific items ☛

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

White, 100% cotton (preshrunk) T-shirts are guaranteed for comfort and durability. Each shirt features an original design.

N.C. WILD T-SHIRT
N.C. WILD logo printed on front and colorful art on back. $14.50.
ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE IN N.C. T-SHIRT
WINC magazine logo on front pocket. Tundra swan art on back. $14.50.
ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD CAP
N.C. WILD logo is embroidered on a pro-shape, brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. $16.50.
ITEM CODE **A1**

WILDLIFE IN N.C. CAP
Brook trout and magazine logo are embroidered on a sage-colored, premium weight, pigment-dyed, brushed cotton cap with an unstructured front, an extended bill, and a nubuck suede closure. $16.50. ITEM CODE **A3**

WILDLIFE IN N.C. CAPS
Each embroidered with magazine logo and buck deer silhouette. Described left to right. **$16.50 each.**

Blaze orange with brown waxcloth bill. ITEM CODE **A7**

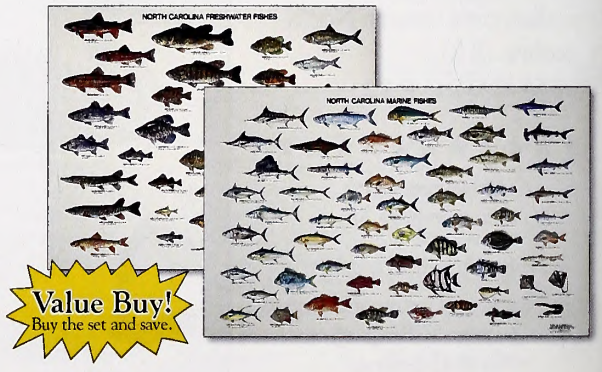
Advantage® Camouflage with tan suede bill. ITEM CODE **A6**

While supplies last! Stone with navy canvas bill. ITEM CODE **A2**

FROGS OF N.C. (THE HYLIDS)
Presents all 15 of the state's tree frogs, cricket frogs and chorus frogs. 22" x 34". $6. ITEM CODE **P11**

LIZARDS OF N.C.
12 of the state's lizard species. 22" x 34". $6. ITEM CODE **P3**

TURTLES OF N.C.
21 of the state's turtle species. 22" x 34". $6. ITEM CODE **P4**



SNAKES OF N.C. (LIVEBEARERS)
17 of the state's snake species. 22" x 34". $6. ITEM CODE **P5**

SNAKES OF N.C. (EGGLAYERS)
19 of the state's snake species. 22" x 34". $6. ITEM CODE **P8**

SET OF 4 POSTERS
Save $6 by purchasing the set of four posters (**P3-P8**). $18.
ITEM CODE **P10**

N.C. FRESHWATER FISHES
Find your favorite fish with this color poster showing 36 of the state's freshwater fishes. 28" x 22½". $6. ITEM CODE **P6**

N.C. MARINE FISHES
All the colors of the sea can be found on this poster of 60 marine fishes. 35" x 22½". $6. ITEM CODE **P7**

N.C. FRESHWATER AND MARINE FISHES
Save $2 when you buy both posters as a set. $10. ITEM CODE **P9**

Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50. ITEM CODE M9

Also available as a boxed set. $30. ITEM CODE M10

Dogs that Point, Fish that Bite

Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission. Hardbound. 220 pages. $19.95. ITEM CODE M8

Wildlife in North Carolina Book

The best of *Wildlife in North Carolina* magazine. Hardbound. $12. ITEM CODE M3

Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. $10. ITEM CODE M2

North Carolina Wild Places Map

Artist's Proof. $40. ITEM CODE E2
Limited Edition. $25. ITEM CODE E3
Poster. $6. ITEM CODE E4

North Carolina Wild Places Posters

(Set of 3): Posters of "Old Field" and "Mountain Cove Forest" from *North Carolina WILD Places: A Closer Look.* 19 1/2" x 16". Shipped folded with poster version of WILD Places Map. $8. ITEM CODE E5

Wild Places Book and Posters

Buy the *North Carolina WILD Places* book and all three posters and save! (Items E1 and E5) $16. ITEM CODE E6

Value Buy! Buy the set and save.

Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2. ITEM CODE M6

North Carolina Wild Places: A Closer Look

Easy-to-read text and Anne Marshall Runyon's delightful illustrations make wildlife habitats come alive in this 82-page book. Discusses 13 habitats across the state. $10. ITEM CODE E1

Scouting Correlations

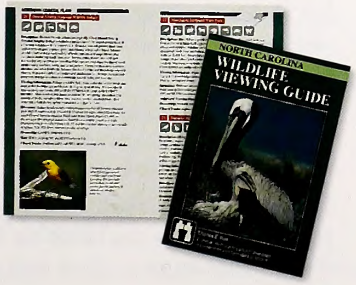
Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
Cub & Boy Scout Correlation. ITEM CODE E9
Girl Scout Correlation. ITEM CODE E10

North Carolina Wild Places Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. $6. ITEM CODE E7

North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. $5.95. ITEM CODE N6



North Carolina Wild Journal

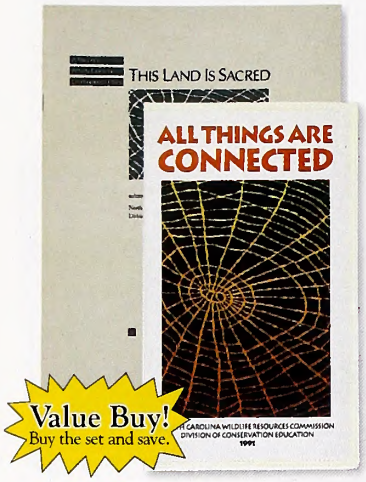
Handy calendar notes on wildlife behavior through the year, with room for personal observations. Supplements N.C. WILD Education Sites workshop. $6. ITEM CODE E8

More terrific items

N.C. WILD STORE

All Things Are Connected & This Land Is Sacred

Video and Teacher's Guide package. $22. ITEM CODE W3

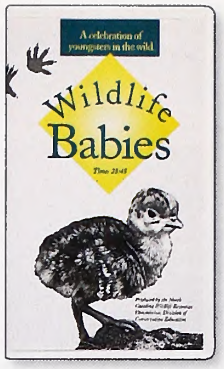


All Things Are Connected

Stirring 12-minute video adaptation of Chief Seattle's speech introduces environmental ethics. $20.
ITEM CODE W1

This Land Is Sacred (Teacher's Guide)

Classroom activities to accompany All Things Are Connected video.
$4.50. ITEM CODE W2

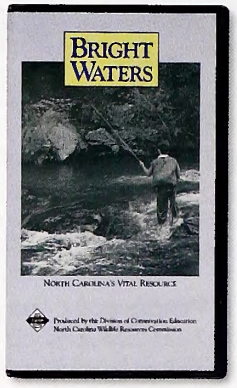


Wildlife Babies

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others. $20. ITEM CODE N9

Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. $2. ITEM CODE M5



Bright Waters (Video)

30-minute video on fishing and fisheries management in North Carolina's freshwater creeks, rivers and ponds. $20. ITEM CODE N7

WILDLife Profiles

Each set is designed to fit your standard 3-ring binder and features 10 animal fact sheets. $2 per set.

Set 1. Black bear, raccoon, white-tailed deer, striped skunk, bobwhite quail, wild boar, muskrat, mourning dove, coyote, mallard. ITEM CODE W4

Set 2. Mink, canvasback duck, red fox, wild turkey, beaver, American river otter, Canada goose, bobcat, red wolf, cougar. ITEM CODE W5

Set 3. Humpback whale, black duck, osprey, clapper rail, red-shouldered hawk, cottonmouth, diamondback terrapin, largemouth bass, black crappie, channel bass. ITEM CODE W6

Set 4. Brook trout, garden spider, Tar spiny mussel, wood duck, bullfrog, mayfly, tiger salamander, bog turtle, hellbender, shortnose sturgeon.
ITEM CODE W7

Set 5. Cottontail rabbit, gray squirrel, northern flying squirrel, newt, common crow, red-tailed hawk, prothonotary warbler, bluegill, striped bass, Eastern oyster. ITEM CODE W8

Set 6. Opossum, peregrine falcon, Eastern bluebird, American toad, rat snake, Eastern glass lizard, smallmouth bass, brown trout, monarch butterfly, Virginia big-eared bat. ITEM CODE W9

Set 7. Chipmunk, gray fox, bald eagle, loggerhead shrike, common snapping turtle, five-lined skink, bluefish, rainbow trout, grasshopper, horseshoe crab.
ITEM CODE W10

Set 8. Appalachian cottontail, manatee, barred owl, turkey vulture, Neuse River waterdog, spring peeper, coral snake, American alligator, American eel, American shad. ITEM CODE W11

Set 9. Southern flying squirrel, fox squirrel, great horned owl, snowy egret, Southern leopard frog, corn snake, Atlantic sturgeon, walleye, luna moth, crayfish. ITEM CODE W12

Set 10. Marsh rabbit, woodchuck, hooded warbler, whippoorwill, green salamander, copperhead, fence lizard, muskellunge, chain pickerel, Scotch bonnet. ITEM CODE W13

Set 11. Atlantic croaker, Southern flounder, summer flounder, spot, king mackerel, Spanish mackerel, sea mullet, weakfish, spotted seatrout, striped mullet. ITEM CODE W14

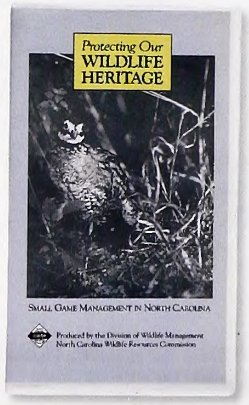
Set 12. Bay scallop, black sea bass, blue crab, brown shrimp, spiny dogfish and smooth dogfish, gag, hard clam, menhaden, sandbar shark, white perch.
ITEM CODE W15

N.C. WILD Notebooks

Each set contains eight issues of *North Carolina WILD Notebook*, the Commission's prize-winning conservation education newsletter. $3 per set.

'95-'96 Set ITEM CODE E11

'96-'97 Set ITEM CODE E12



Protecting Our Wildlife Heritage (Video)

25-minute video offers useful tips for landowners on managing small game. $20. ITEM CODE N8

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Use this form to order educational products. Use the magazine subscription form inside for magazine orders.

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Make checks payable to: N.C. Wildlife Resources Commission. Send your order to: The N.C. WILD Store, PO Box 29607, Raleigh, N.C 27626-0607.

All orders must be prepaid. We do not bill. Please do not send cash. Allow 4 weeks for delivery of your order. $20.00 service charge for returned checks (N.C.G.S. 25-3-512). Products may be purchased over the counter at The N.C. WILD Store, 322 Chapanoke Road, Raleigh, N.C. Telephone (919) 662-4377.

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All proceeds from the sale of these products support the development and production of conservation education projects and programs.

LIFETIME LICENSES AND LIFETIME MAGAZINE SUBSCRIPTIONS

ENDOW 98

Complete form and mail with proper payment to: Wildlife Endowment Fund, N.C. Wildlife Resources Commission, PO Box 29565, Raleigh, NC 27626-0565.
Office is located at 322 Chapanoke Rd., Raleigh, NC 27603. Telephone 1-888-NCWILDLIFE or 1-888-629-4535.
Please make checks payable to the Wildlife Endowment Fund. $20 service charge for returned checks (NCGS 25-3-512).

PRICE

☐ Lifetime Comprehensive Fishing (residents only) (includes basic fish, trout and trout waters on game lands) $250.00
☐ Lifetime Subscription to *Wildlife in North Carolina* magazine $100.00

Infant and Youth Licenses:

☐ Lifetime Sportsman Infant (under 1 year of age) (Application must be received before one year of age) $200.00
☐ Personalized Lifetime Sportsman Infant (under 1 year of age) (Application must be received before one year of age) $205.00
☐ Lifetime Sportsman Youth (age 1 through 11) (Application must be received before 12 years of age) $350.00
☐ Personalized Lifetime Sportsman Youth (age 1 through 11) (Application must be received before 12 years of age) $355.00

A copy of a certified birth certificate (or the mother's copy) must accompany applications for sportsman's licenses for infants and youths.
Please note: Hospital copies will not be accepted. Also, birth certificates cannot be returned.

Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult at least 21 years of age, who is properly licensed to hunt in North Carolina. "Accompanied" is defined as being able to take immediate control of the hunting device.

☐ Lifetime Sportsman (residents only) (age 12 or older) (includes basic hunt and fish, big game, game lands, primitive weapons, trout, N.C. waterfowl [Federal waterfowl stamp is mandatory and must be purchased separately.]) $500.00
☐ Personalized Lifetime Sportsman (residents only) (age 12 or older) $505.00
☐ Lifetime Nonresident Sportsman (age 12 or older) (includes basic hunt and fish, big game, game lands, primitive weapons, trout, N.C. waterfowl [Federal waterfowl stamp is mandatory and must be purchased separately.]) $1,000.00
☐ Lifetime Comprehensive Hunting (residents only) (includes basic hunt, big game, game lands, primitive weapons) $250.00

On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or making out a written statement that he had such a license.

Check appropriate block and attach required copy

☐ Copy of Prior Year Hunting License ☐ Copy of Hunter Safety Certificate of Competence
☐ In lieu of copy, I am completing a written statement (complete below).

STATEMENT: I CERTIFY THAT I WAS A LICENSED HUNTER PRIOR TO JULY 1, 1991.

Date _____ Signature of Applicant _____

PLEASE TYPE OR PRINT LEGIBLY

Applicant Name: _____ (First) (Middle) (Last)

Address: _____ (Street/R.F.D.) (City) (State) (Zip)

Date of Birth _____ (Month/Day/Year) Social Security No.: _____ Driver's License No.: _____

Male: ☐ Female: ☐ Telephone Number: (____) _____ County _____

_____ Date _____ Applicant or Donor Signature

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Naughty...

or Nice?

Either way, we hope this issue has brought you some holiday cheer.

Happy holidays from the staff of

WILDLIFE IN NORTH CAROLINA

Photographs by Melissa McGraw

Ducks in Arrest

Even ducks need a rest stop every now and then. Seeing a pair of beautiful wood ducks like this tranquil couple is one of the pleasures of inland duck hunting.

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